

# Senior Teaching Associate in Computational Continuum Modelling

Department of Physics  
Deadline: 12th May 2024  
Job Reference: KA41184



# The role

**Salary:**

£40,521– £54,395

**Contract:**

3 years fixed term

**Location:**

West Cambridge

**Department:**

Physics

**Responsible to:**

MPhil Course Director

**Working pattern:**

Part time (0.8FTE)

**Start date:**

Immediate

## Role summary

The School of Physical Sciences invites applications for a **Senior Teaching Associate** in the field of Computational Continuum Modelling and High Performance Computing to be held in the Department of Physics. This position has been established to support the expansion of the cohort size of the MPhil in Scientific Computing <https://mphil.csc.cam.ac.uk/>

The MPhil is a full-time course which provides education on high performance computing and advanced algorithms for numerical simulation at continuum and atomic-scale levels.

The MPhil has a taught and a research element which carry equal examination credit. Students attend lecture modules on theory, algorithms and methods for modelling and numerical simulation, as well as research computing, software development and high-performance computing. This theoretical knowledge, which is complemented by hands-on practical sessions and written assignments (both involving coding), provides a solid foundation for the research project carried out during the second part of the academic year.

Depending on their background, students attend courses on numerical algorithms for the solution of nonlinear partial differential equations (continuum stream), or on modelling of materials, molecular dynamics, Monte Carlo techniques, electronic structure and density functional theory (atomistic stream).

All students attend lectures on high performance computing including object-oriented programming languages (C++) and parallelisation approaches (GPGPU programming, MPI and OpenMP). The lectures are complemented with hands-on practicals on local computers as well as on the University's HPC service. The research projects are on science or technology topics which are studied by means of scientific computation.

The successful candidate will provide support and contribute to the continuum stream and the high performance computing teaching schedule, and are therefore expected to have extensive experience in those areas. In particular they should be able to demonstrate a comprehensive understanding of, and show practical experience with, the mathematics of systems of nonlinear inhomogeneous partial differential equations, and shock-capturing, Riemann problem based numerical algorithms for their solution. They must also be proficient in C++ and the techniques required for software development best practice. Familiarity with methods for high-performance computing such as parallelisation is essential. For more information on the course modules, please see: [https://mphil.csc.cam.ac.uk/course\\_structure/](https://mphil.csc.cam.ac.uk/course_structure/)

They should also have a proven track record of delivering lectures or computational practical classes, and be an excellent communicator. They must be highly organised and motivated and should demonstrate aptitude for programme coordination. It is expected that they will hold, or be imminently completing, a PhD in mathematics or physics (or a cognate discipline). Due to the fast-moving nature of the topics covered in the MPhil, the role holder would be expected to participate in the research activities of the research group associated with the programme (The Laboratory for Scientific Computing), to maintain their knowledge of the current status of research, and techniques used within them.

The successful candidate will be expected to support the MPhil primarily by: the creation and delivery of course modules; the supervision, assessment and examination of modules, the provision, supervision and assessment of written assignments and research projects across a range of continuum and HPC topics.

# The role



They will also be expected to participate in the administration of tasks associated with the academic delivery of these programmes like overseeing the seminar series and industry led modules, and the coordination and delivery of non-examined short courses on advanced topics or transferable skills.

A new Academic Career pathway scheme for Teaching and Scholarship staff (ACP T&S) has been developed to recognise and reward outstanding contributions and celebrate academic achievement through promotion and/or pay progression. This post falls within this career pathway scheme. Further details of the scheme are available at <https://www.acptands.hr.admin.cam.ac.uk/acp-overview>

The Departments are active in promoting policies to address historic under-representation of women and minority groups in its workforce. Candidates from under-represented groups, as well as candidates with a track record in addressing barriers to equality and diversity in education, are particularly encouraged to apply.

## Application process

Applicants should submit the following documents with their application:

- Cover letter summarising their suitability for this post
- Curriculum Vitae (CV)
- An experience statement of up to two pages setting out their past work in scientific computing related to computational continuum modelling and high performance computing and how it relates to the skills required for this position.
- A teaching statement (no more than one A4 page) setting out their approach to teaching and the contributions they can make to the MPhil programme in Scientific Computing.
- Evidence of teaching contribution at undergraduate or postgraduate levels (e.g. lecture notes, computing practical sheets etc).

Please include details of three referees, including e-mail address and phone number, whom the University of Cambridge can contact for references.

The deadline for applications is 12th May 2024

Shortlisted applicants will be invited to visit Cambridge in May 2024 to give a teaching presentation, for informal discussions and formal interview.

The position is available immediately with a start date no later than October 2024. For informal enquiries please contact Prof. N. Nikiforakis (Email: [nn10005@cam.ac.uk](mailto:nn10005@cam.ac.uk)).

Please quote reference KA41184 on your application and in any correspondence about this vacancy.

The University actively supports equality, diversity and inclusion and encourages applications from all sections of society.

The University has a responsibility to ensure that all employees are eligible to live and work in the UK.

# Person specification

	Essential	Desirable
<b>Education</b>		
Educated to degree level, with a PhD in Mathematics, Physics or a closely related discipline, or evidence that completion of such a PhD is imminent	√	
<b>Academic</b>		
Evidence of extensive experience on scientific computing applied to nonlinear hyperbolic PDEs and Riemann solvers	√	
Experience of successfully developing and delivering lectures, seminars or computational practical classes.		√
Evidence of successful teaching of the syllabus of the continuum or HPC modules of the course		√
Evidence of supervision or co-supervision of research students	√	
<b>Specialist knowledge and skills</b>		
A strong track record in programming with C++	√	
A strong track record on parallelisation approaches (one or more of GPGPU programming, MPI and OpenMP)	√	
Active engagement in relevant research projects, at the level commensurate with the candidate's experience	√	
<b>Experience</b>		
Willingness to contribute to the academic administration of the relevant Departments	√	
Experience of organisation, management, leadership, communication and programme development.		√

# The Cavendish Laboratory



**The Cavendish Laboratory (Department of Physics) was founded in 1871, with the simultaneous appointment of James Clerk Maxwell as the first Cavendish Professor. It has a distinguished history of contribution to science. Thirty-three Nobel prize winners have worked for considerable periods within the Laboratory, and the Cavendish is associated with many notable discoveries, including the identification of the electron and the neutron, determining the structure of DNA, and the discovery of pulsars.**

**A new era is beginning for Physics at Cambridge, with construction work underway for a new purpose-built centre for world-leading research, replacing our current buildings which date from 1971. The new building, the Ray Dolby Centre, and our strategic plan, both represent a renaissance in the way we carry out physics research and achieve our research goals. The spirit of adventure and innovation will be fostered in the Cavendish tradition, but adapted to the new needs of frontier research.**

## **About the Department**

At the heart of the new approach is a more flexible alignment of our research activities into research themes. This change of emphasis has been inspired by a number of changes in the nature of contemporary physics research. See: <https://www.phy.cam.ac.uk/research>.

In addition to serving as a home for physics research at Cambridge, the new Cavendish Laboratory will be a top-class facility for the nation - much of the specialised research equipment in the new building will be made available to other institutions. The new facility has been designed to match the more exacting standards of current research,

and to serve the educational needs of future generations of students much better than is possible at our existing site. Capacity for public events has also been incorporated into the design, so that our extensive programme of outreach work with schools, and with the general public, will continue to serve the local population well into the future. We are looking forward to moving into our new home in 2024.

## **Key information**

Currently the Department comprises about 55 academic staff, 200 postdoctoral researchers, and 300 graduate students. Together with administrative and technical support staff and academic visitors, the Department hosts around 1000 people.

## **Athena SWAN**

The Department of Physics is very proud to be the first Physics Department in the UK to have been awarded an Athena SWAN Gold award from May 2014, having held a Silver award and also Juno Champion status since 2010. The Department is keen to promote support for staff with family commitments.

# The Centre and the MPhil in Scientific Computing

The Centre for Scientific Computing (CSC) at the Department of Physics is an ecosystem of training and research and a genuine two-way partnership of academia and industry. It trains early-stage researchers from Master's level through to PhD and contributes to their continuous professional development by means of short courses and their active engagement with industrial projects. See [www.csc.cam.ac.uk](http://www.csc.cam.ac.uk)

The **MPhil in Scientific Computing** is a full-time 12 month course covering topics of high-performance scientific computing and advanced numerical methods and techniques.



It was established in 2010 and it produces graduates with rigorous research and analytical skills who are exceptionally well-equipped to proceed to doctoral research or directly into employment in industry, the professions and the public service. It also serves as the first year of the four-year doctoral training programme in Computational Methods for Materials Science.

Students completing the MPhil in Scientific Computing have:

- a comprehensive understanding of numerical methods, and a thorough knowledge of the literature, applicable to their own research;
- demonstrated originality in the application of knowledge, together with a practical understanding of how research and enquiry are used to create and interpret knowledge in their field;
- shown abilities in the critical evaluation of current research and research techniques and methodologies;
- demonstrated self-direction and originality in tackling and solving problems, and acted autonomously in the planning and implementation of research.

The course is nationally and internationally recognised for its high quality of training and it has been consistently praised by its External Examiners and the UK Research Councils. The success of this course in the current competitive Master's-level market is because it offers an internationally unique combination of a broad curriculum in computational continuum as well as atomic-level physics, alongside highly transferable skills in algorithms development and high performance computing. These are assessed by a combination of written examination papers, written assignments and a research project.

As a result, course graduates are highly sought after by employers and academic supervisors for fully-funded PhD places, since they are invariably ahead of their peers in terms of training as well as demonstrating their capacity for research.

The course has broader impact at university level since most of the Departments of the Schools of Physical Sciences and Technology have recruited a substantial number of students from this course, and current PhD students and post-docs attend modules as part of their continuous professional development.

There is also impact at a national and international level, since a condensed version of this MPhil has been offered since 2011 as an intensive two-week summer school in High Performance Computing, to train early career scientists.

For more information about the course and its structure see:  
<https://mphil.csc.cam.ac.uk/>

# The Cavendish Laboratory - Teaching

The course taken by science students in Cambridge is known as the Natural Sciences Tripos. (Tripos is a term with mediaeval origins thought to relate to three-legged stools used by early scholars.) The Tripos curriculum covers all the physical and biological sciences, but is separate from engineering, medicine and mathematics.

In their first year (Part IA), students typically divide their time between three experimental sciences and mathematics; with about 360 students taking physics.

In the second year (Part IB), about 200 students spend two thirds of their time studying physics and one third another subject, usually mathematics.

In the third year (Part II), they concentrate on physics and after successful completion of this year, they can graduate with a Bachelors degree.

Most students (around 150) continue to a fourth year (Part III), where they take a range of Masters level courses in physics and related disciplines, undertake an advanced project, and graduate with both a Bachelors and Masters degree.

The structure of the Natural Sciences Tripos ensures that in the early years our students are exposed to a range of disciplines. The very competitive nature of entry to Cambridge means that they are hand-picked for the

motivation to learn about science; none are taking our courses simply to score required credits.

The teaching year is short and intense, comprising three terms of eight weeks, and in the first three years most of the assessment of undergraduates is by end of year examination. Further details of the Department's teaching programme can be found here:

[www.phy.cam.ac.uk/students/teaching](http://www.phy.cam.ac.uk/students/teaching)



# The School of the Physical Sciences

The School of the Physical Sciences is one of the six Schools in the University of Cambridge and comprises the following Departments:

- Applied Mathematics and Theoretical Physics (DAMTP)
- Chemistry
- Earth Sciences
- Geography (including the Scott Polar Research Institute)
- Institute of Astronomy
- Issac Newton Institute of Mathematical Sciences
- Materials Science and Metallurgy
- Physics (Cavendish Laboratory)
- Pure Mathematics and Mathematical Statistics (DPMMS)

## About the School

The School is responsible for allocating core funds to departments and provides broad strategic focus across its constituent departments in a number of areas including; research activity, undergraduate and graduate education, estate needs, fundraising and human resources. As part of the University's annual planning cycle, the School prepares a financial and academic plan which sets out strategic objectives, determines budgets as well as the flow of resources to departments. The School manages a wide range of administrative activities and projects across its departments and works alongside other Schools to further interdisciplinary research.

The School has over 1500 members of staff, over 3000 students and an annual budget of over £100 million.





# Terms of appointment

## Tenure and probation

Appointment will be made on a fixed-term basis of 3 years. Appointments will be subject to satisfactory completion of a 2 year probationary period.

## Hours of work and working pattern

The hours of work for the position are part time (29.5 hours per week). Working pattern will be discussed with the successful candidate.

## Pension

You will automatically be enrolled to become a member of USS (Universities Superannuation Scheme) – a hybrid pension scheme. For further information please visit: [www.pensions.admin.cam.ac.uk/](http://www.pensions.admin.cam.ac.uk/)

## Annual leave

Full time employees are entitled to annual paid leave of 41 days inclusive of public holidays. For new part-time employees, annual leave will be pro rata'd based on days worked.

## General information

### Pre-employment checks

Right to work in the UK We have a legal responsibility to ensure that you have the right to work in the UK before you can start working for us.

If you do not have the right to work in the UK already, any offer of employment we make to you will be conditional upon you gaining it.

### Health declaration

Once an offer of employment has been made the successful candidate will be required to complete a work health declaration form.

### Qualifications

The person specification for this position lists qualifications that are essential and/or desirable. Please note that if you are offered the post you will be asked to provide your relevant original certificates of these qualifications.

### References

Offers of appointment will be subject to the receipt of satisfactory references.

### Information if you have a disability

The University welcomes applications from individuals with disabilities. We are committed to ensuring fair treatment throughout the recruitment process. We will make adjustments to enable applicants to compete to

the best of their ability wherever it is reasonable to do so and, if successful, to assist them during their employment.

Information for disabled applicants is available at

[http:// www.admin.cam.ac.uk/offices/hr/staff/ disabled/](http://www.admin.cam.ac.uk/offices/hr/staff/disabled/)

We encourage you to declare any disability that you may have, and any reasonable adjustments that you may require, in the section provided for this purpose in the application form. This will enable us to accommodate your needs throughout the process as required. However, applicants and employees may declare a disability at any time. If you prefer to discuss any special arrangements connected with a disability, please contact, the Department Administrator, who is responsible for recruitment to this position.

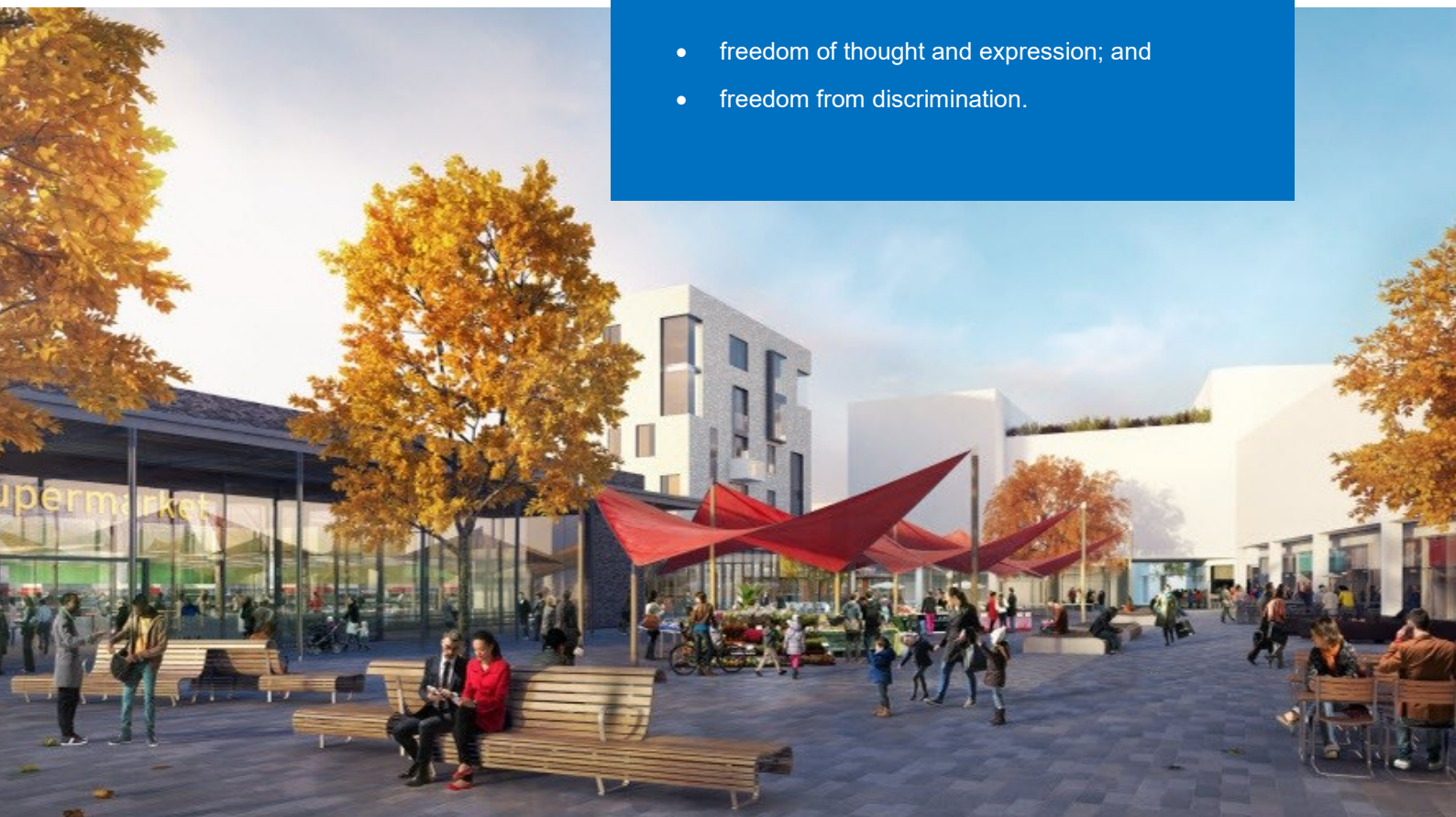
# The University

**The University of Cambridge is one of the world's oldest and most successful universities. We are a renowned centre for research, education, and scholarship that makes a significant contribution to society. The University is consistently ranked amongst the top universities in the world. Our affiliates have won more Nobel Prizes than any other University.**

Our sustained pursuit of academic excellence is built on a long history of first-class teaching and research within a distinctive collegiate system. For eight centuries our ideas and innovations have shaped the world. Our principal goal is to remain one of the world's leading universities in an increasingly competitive global higher education sector. Today the University of Cambridge is at the centre of a cluster of over 4,300 businesses employing 58,000 people. Our capital investment projects include the West Cambridge site, the North West Cambridge development and the growth of the Biomedical Campus in the south of the city. The North West Cambridge development includes the opening of a primary school – the first in the UK to be managed by a University. So we are deeply embedded in, and committed to serving, our local community. These are all conspicuous signs of a University that is not only adapting to new needs, but also anticipating the future.

Our mission is to contribute to society through the pursuit of education, learning, and research at the highest international levels of excellence. Our core values are:

- freedom of thought and expression; and
- freedom from discrimination.





## About us

**The University is one of the world's leading academic centres.** It comprises 150 faculties and departments, together with a central administration and other institutions. Our institutions, museums and collections are a world-class resource for researchers, students and members of the public, representing one of the country's highest concentrations of internationally important collections.

The University has an annual income of £1.66 billion. Research income, won competitively from the UK Research Councils, the European Union (EU), major charities and industry, exceeds £400 million per annum and continues to grow.

The Colleges and the University remain committed to admitting the best students regardless of their background and to investing considerable resources both in widening access and financial support.

The 31 Colleges are self-governing, separate legal entities which appoint their own staff. Many academic staff are invited to join a College as a Teaching Fellow, which provides a further social and intellectual dimension. The Colleges admit students, provide

**Our ideas and innovations have shaped the world. Our campaign, 'Dear World... Yours, Cambridge', will raise £2 billion to help us shape all our futures.**

student accommodation and deliver small group teaching. The University awards degrees and its faculties and departments provide lectures and seminars for students and determine the syllabi for teaching and conducting research.

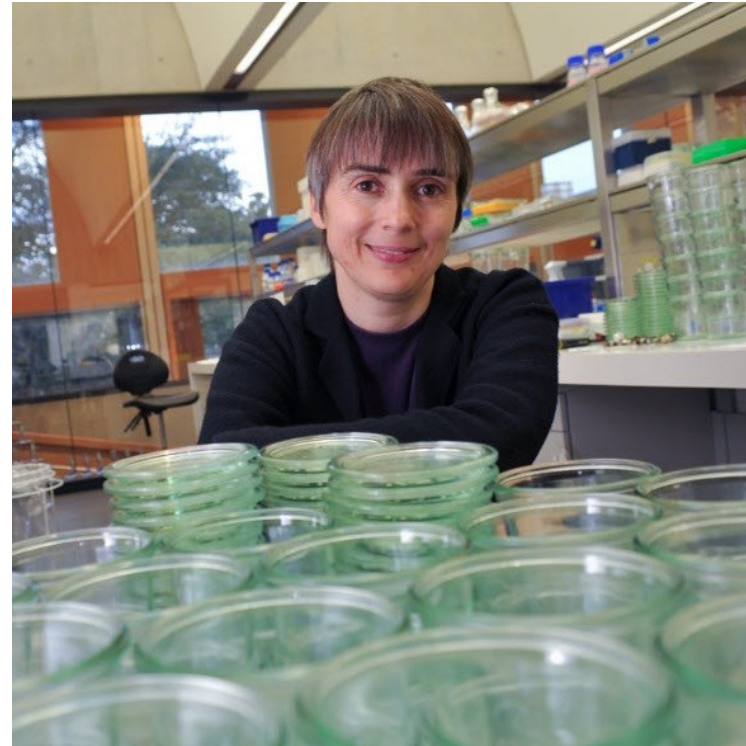
The University's estate is undergoing the most significant transformation in its history. Cambridge has been able to create a new science and technology campus to the west of the city centre, and is now expanding further to the north west of Cambridge including investing in affordable homes for University key workers and community facilities. Even with our continued development, the University remains within walking or cycling distance across the campus. The University is a major partner on the Cambridge Biomedical Campus and we continue to redevelop our historic city centre sites demonstrating our determination to ensure that we can offer the best facilities and opportunities for our staff and students.

Our instinct for seeking out excellence and setting up enduring and mutually beneficial collaborations has led us to establish strategic partnerships across the globe. Whether it is the successful Cambridge-Africa Programme involving universities in Ghana, Uganda and elsewhere on the African continent; or the close association with the government of India to pursue new research in crop science; or the creation, with Germany's Max Planck Institutes, of a Cambridge-based centre for the study of ethics, human economy and social change – international partnerships are now an inextricable part of the University's make-up.

# Working at the University

**Working at Cambridge you will join a diverse, talented and innovative community, with more than 18,000 students and over 11,000 staff from all walks of life and corners of the world.**

The University continually explores strategies to attract and retain the best people. It is committed to supporting its staff to achieve their best. We are a fair, diverse and inclusive society and we believe our staff are our greatest asset. There is strong commitment to developing institutional leadership and supporting and encouraging staff development at all levels. Furthermore, the University's Athena SWAN award recognises and celebrates good practice in recruiting, retaining and promoting women. We offer a variety of roles including academic, research, professional, managerial and support roles. We also offer extensive benefits and excellent learning opportunities within a stimulating working environment. The University has signed up to the Race Equality Charter, a notional framework for improving the representation, progression and success of minority ethnic staff and students within higher education.



# Living in Cambridge



**Cambridge is rich in cultural diversity.** From beautiful University and College buildings, museums and art galleries, quaint gardens and punts on the River Cam, to a vibrant restaurant and café scene, our employees are surrounded by the wonderful features of this unique city.

If you prefer the faster pace of life, London is a 45 minute train journey away. For those travelling from overseas, Stansted Airport is just 45 minutes away and Heathrow Airport under 2 hours away.



The University is a short distance from a host of other attractions such as Ely Cathedral, Newmarket Races and various wildlife parks and stately homes.

Cambridge is also within easy reach of the beautiful Broads and coastlines of Norfolk and Suffolk.

Further information about attractions in and around Cambridge can be found at [Visit Cambridge](http://www.visitcambridge.org), the official tourism website for the city.

# What Cambridge can offer

**We offer a comprehensive reward package to attract, motivate and retain high performing staff at all levels and in all areas of work.** The University offers a wide range of competitive benefits, from family leave entitlement, to shopping and travel discount schemes. Our generous annual leave package contributes to the positive wellbeing of our University employees. Sabbatical leave enables academics to focus on research and scholarship, whilst still maintaining their full salary. The University also has a career break scheme for academic and academic-related staff, with additional flexible working policies for all other staff.

## **CAMBens employee benefits**

We offer a CAMBens scheme for University employees, providing access to online and in-store shopping discounts and cashback. With more than 2,000 participating retailers, employees can save money on a wide range of household expenses, from groceries and clothes, to holidays and insurance and much more. A range of local discounts are also available, helping employees to save money whilst also supporting local Cambridge businesses. CAMBens Cars and CAMBens Cycle to Work salary sacrifice schemes are also available, which enable employees to save money on transport costs. A 10% discount rate on the purchase of train season tickets, bulk buy tickets and an interest free travel to work loan are also available for staff of the University of Cambridge.

## **Family-friendly policies**

The University recognises the importance of supporting its staff. We have a range of family-friendly policies to aid employees' work-life balance including a generous maternity, adoption and shared parental leave

entitlement of 18 weeks full pay and emergency family care support via My Family Care. In addition, our highly regarded workplace nurseries, childcare vouchers, a childcare salary sacrifice scheme and a high quality holiday play scheme are available to help support University employees with caring responsibilities. The Newcomers and Visiting Scholars Group is an organisation within the University run by volunteers whose aim is to help newly arrived wives, husbands, partners and families of Visiting Scholars and members of the University to settle in Cambridge and give them an opportunity to meet local people. The Office of Postdoctoral Affairs supports the postdoctoral community within Cambridge. Further details are available here: <https://www.opda.cam.ac.uk/>

## **Your wellbeing**

The University's Sport Centre, Counselling Services and Occupational Health are just some of the support services available to University employees to promote their physical and mental wellbeing. There are many societies in Cambridge catering for almost every taste and interest. Whether you want to take part in a sport, participate in music or drama, pursue a hobby, or join a political group, you will almost certainly find that a society exists for this purpose. The University also hosts the Cambridge Science Festival and Cambridge Festival of Ideas, as well as Open Cambridge weekend, which together attract over 50,000 visitors per year. The festivals are a great opportunity to get your first taste of public engagement, through volunteering, supporting hands-on activities or proposing a talk.



# What Cambridge can offer

## Pay and benefits

The University salary structure includes automatic service-related pay progression in many of its grades and an annual cost of living increase. In addition to this, employees are rewarded for outstanding contribution through a number of regular pay progression schemes. The University offers attractive pensions schemes for employees, with an additional benefit of a salary exchange arrangement providing tax and national insurance savings. Payroll giving is also a simple, tax-efficient way for employees to make monthly donations to charity.

## Relocating to Cambridge

The University Accommodation Service exists to help employees in their search for a rental home in Cambridge. A new University development at North West Cambridge called Eddington offers subsidised rented accommodation to University staff. The development consists of high quality furnished one and two bedroom apartments. For more information about the development and how to apply please visit the website [www.nwcambridge.co.uk](http://www.nwcambridge.co.uk)

The importance of helping individuals settle into a new area is also recognised by the University. The Shared



Equity Scheme <https://www.hr.admin.cam.ac.uk/pay-benefits/cambens-employee-benefits/financial/shared-equity-scheme> provides financial assistance to qualifying new members of staff with the purchase of living accommodation, where they have to relocate to take up their appointment. Removal expenses are also available for qualifying new members of staff.

## Equality & diversity

The University has a vibrant and varied community. We support and encourage under-represented groups and we value diversity. We welcome applications from individuals with disabilities. Our recruitment and selection procedures follow best practice. We have an



Equal Opportunities Policy, along with a range of diversity networks for women, black and minority ethnic and lesbian, gay, bisexual and transgender staff. More details are available here: <http://www.equality.admin.cam.ac.uk/>

## Development opportunities

We support new employees to settle in through various activities. The encouragement of career development for all staff is one of the University's values and we put this into practice through various services and initiatives. Our Personal and Professional Development Department provides development opportunities and courses for all University employees. These include face-to-face sessions, online learning modules and webinars. Employees may also apply for financial support to undertake training that will lead to a qualification. We offer reduced staff fees for University of Cambridge graduate courses and the opportunity to attend lectures and seminars held by University departments and institutions. The CareerStart@Cam programme also supports employees in assistant staff roles who do not hold higher education qualifications to develop their skills, experience and qualifications.

**Whether it is understanding the molecular basis of neurodegenerative diseases, or helping farmers in India increase their yield, or discovering better ways to live in large cities – I know that what we do in Cambridge affects lives, and livelihoods, the world over.**

*Vice Chancellor Emeritus, Professor Sir Leszek Borysiewicz, 2016*

# How to apply

Applications should be submitted online via the University of Cambridge jobs page [www.jobs.cam.ac.uk](http://www.jobs.cam.ac.uk) by clicking “Apply online” in the job advert. You will need an email address to register for our online system.

Informal enquiries are welcomed and should be directed to:  
Professor Nikos Nikiforakis

**Email:** [nn10005@cam.ac.uk](mailto:nn10005@cam.ac.uk)

If you have any queries regarding the application process please contact [hr@phy.cam.ac.uk](mailto:hr@phy.cam.ac.uk)

The closing date for applications is 12th May 2024