



University of Oxford Department of Computer Science

## Job description and selection criteria

<b>Job title</b>	Research Fellow in Information Visualisation for the Biological Sciences
<b>Division</b>	MPLS
<b>Department</b>	Computer Science
<b>Location</b>	Wolfson Building, Parks Road, Oxford.
<b>Grade and salary</b>	Grade 7: Salary £29,099-£35,788 p.a.
<b>Hours</b>	37.5
<b>Contract type</b>	Fixed term contract for up to 3 years (with the possibility of extension for a further 2 years)
<b>Reporting to</b>	Prof. David Gavaghan

### Introduction

#### The University

The University of Oxford is a complex and stimulating organisation, which enjoys an international reputation as a world-class centre of excellence in research and teaching. It employs over 10,000 staff and has a student population of over 21,000.

Most staff are directly appointed and managed by one of the University's 130 departments or other units within a highly devolved operational structure - this includes 5,900 'academic-related' staff (postgraduate research, computing, senior library, and administrative staff) and 2,820 'support' staff (including clerical, library, technical, and manual staff). There are also over 1,600 academic staff (professors, readers, lecturers), whose appointments are in the main overseen by a combination of broader divisional and local faculty board/departmental structures. Academics are generally all also employed by one of the 38 constituent colleges of the University as well as by the central University itself.

Our annual income in 2009/10 was £879.8m. Oxford is one of Europe's most innovative and entrepreneurial universities: income from external research contracts exceeds £367m p.a., and more than 60 spin-off companies have been created.

For more information please visit [www.ox.ac.uk](http://www.ox.ac.uk)

## MPLS Division

The academic administration of the University is conducted through four divisions (Humanities, Social Sciences, Mathematical, Physical and Life Sciences, and Medical Sciences). The Mathematical, Physical and Life Sciences Division consists of ten constituent departments: the Department of Chemistry, Department of Computer Science, the Department of Earth Sciences, the Department of Engineering Science, the Department of Materials, Mathematical Institute, the Department of Physics, Department of Plant Sciences, Department of Zoology and Statistics. The division provides a framework for interdisciplinary teaching and research. There are also links with the Medical Sciences Division.

For more information please visit: <http://www.mpls.ox.ac.uk/>

## Department of Computer Science

The Department of Computer Science, University of Oxford has one of the longest-established Computer Science departments in the country. Formerly known as the Oxford University Computing Laboratory, it is home to a community of world-class [research](#) and [teaching](#). Research activities encompass core Computer Science, as well as [computational biology](#), [quantum computing](#), [computational linguistics](#), [information systems](#), [software verification](#) and [software engineering](#). The department is home to undergraduates, full-time and part-time Master's students, and has a strong doctoral programme.

For more information please visit: <http://www.cs.ox.ac.uk/>

## Job description

<b>Research topic</b>	Scientific Visualisation
<b>Principal Investigator / supervisor</b>	Professor David Gavaghan
<b>Funding partner</b>	EPSRC and Microsoft Research Cambridge

## Overview

The University of Oxford, University College London and Microsoft Research, Cambridge have recently received funding from the EPSRC Cross-Disciplinary Interfaces Programme (C-DIP) for a programme of research that will involve up to 17 post-doctoral fellowships over the next 5 years. The 2020 Science programme is focused on fostering the creation of a new generation of future scientific leaders – new kinds of scientists with the ability to lead the way in tackling fundamental challenges in science in areas of societal importance. At the heart of the programme is the development and application of computational tools and novel approaches to the scientific computing, scientific software development and software engineering that underpin the development of predictive models of complex, multi-scale natural systems. The programme is closely associated with the Life Sciences Interface and Systems Biology Doctoral Training Centres in Oxford, and the CoMPLEX Doctoral Training Centre at UCL, and it is anticipated that students from each of these DTCs will also undertake research within this programme.

## Responsibilities/Duties

The appointed Research Fellow will play a leading role in developing visualisation solutions that will enhance communication, exploration and development of novel scientific research and software development in Biology and Ecology. Working with the other scientists and software engineers in the programme, the post holder will research and implement engineering-design solutions for: (1) visualisation needs of individual projects and (2) possible cross project platforms/languages that solve common visualisation requirements.

The post requires a keen communicator to understand and capture the visualisation requirements of diverse projects (research spans molecular and cellular to global scales) and a variety of users. The scientists will variously deal with visualisation issues relating to (i) large data sets, (ii) complex data sets and (iii) complex model outputs for spatially and temporally varying systems, and (iv) graphical representation of models. The post holder will work closely with other scientists and software developers in developing software platforms that progress scientific discovery in the programme overall. The post offers a unique opportunity to research and apply computational visualisation solutions for novel communication challenges at the interface of emerging scientific disciplines. The post holder must be a self-starter in order to become integrated into the overall programme efficiently and take the lead on confronting significant scientific visualisation requirements, challenges and opportunities. We will consider diverse technical backgrounds, from designers with technical ability, to scientists and computer scientists who have demonstrably strong design and information communication abilities. We are especially interested in applications from those working at the interface of design and computation.

The overall emphasis of the 2020 Science programme is on producing a new generation of highly computational natural scientists and tool builders able to apply novel approaches to tackle a number of fundamental problems in science. In this respect, all of our fellows are expected to develop their own research interests that make a significant contribution to one or more of the following goal-driven scientific foci:

1. Understanding biomolecular structures and interactions
2. Understanding biological computation: What cells compute, how and why. We anticipate this area to include re-thinking a number of key questions in developmental Biology [from Stem Cells to organs], Immunology and Neuroscience.
3. Programming Life: use of computational science techniques to understand, design and build genetic devices
4. Understanding the future of Life on Earth under a changing environment

A dominant emphasis will be on developing a new generation of models and modelling approaches, especially multiscale and systems modelling from sub-cellular to organ level in health and disease. The modelling will encompass discrete, continuous, stochastic, deterministic and hybrid approaches. Crucial in developing this new approach will be the visualisation solutions of model inputs (in terms of experimental data), model outputs of the model simulations developed by the postholder. Such visualisations will be crucial to enhance the communication, exploration and development of the scientific research programme.

The postholder will carry out research as a member of the University of Oxford, based in one of the Departments associated with the programme (Department of Computer Science, Statistics, Physics, Biochemistry, Engineering Science or the Mathematical Institute) and as such be responsible to the Principal Investigators of the 2020 Science Programme. These appointments will be joint between the University of Oxford and Microsoft Research in Cambridge.

## **Selection Criteria**

### **Essential**

- A PhD in a relevant area (e.g. Information design, Computational Science, Mathematical or Computational Biology, Applied Mathematics, or Computer Science), or a degree in those areas with an excellent portfolio of research in visualisation or information design;
- A documented track record of the ability to conduct and complete research projects, as witnessed by published peer-reviewed work (according to experience of the candidate) and/or a strong portfolio of visualisation work;
- Experience of engineering visualisation solutions from scratch;
- Strong interest or skills in embedding visualisation into software developments;  
Potential to provide leadership and supervision of visualisation activities within the programme
- Experience of producing outstanding and novel scientific visualisations and communicating this work effectively Ability to work on individual projects as well as part of a larger team;
- Good verbal and written communication skills in English;
- A real interest in the research project and a strong desire to work as a research fellow.

### **Desirable**

- Research experience within projects modelling complex natural systems (broadly defined to include biology, medicine, ecology etc);
- Experience of multidisciplinary research settings;
- Demonstrated ability to make clear, well-illustrated presentations
- Experience of teaching/training

## **Scientific Background**

The key scientific challenges of the next century require that we need to accelerate the rate at which we make fundamental advances in science, rather than simply advancing incrementally in areas ranging from how cells work and why/how they go wrong, to having a predictive understanding of the climate and global ecosystems, the consequences of potential changes to them for Earth's life support system, and how to prevent or mitigate deleterious consequences. We wish to understand how these systems behave at the functional level, and how this behaviour arises as a result of highly dynamic, strongly non-linear, tightly coupled interacting processes occurring across multiple spatial and temporal scales. Entirely new kinds of exploratory and predictive models and research strategies are needed to address these challenges. In short, a novel computational approach and environment is needed for doing this kind of science - and this does not exist today.

Progress requires both a cultural and technological change in the way in which mathematical and computational models, tools and software are developed, and a concomitant change in the way in which groups of scientists are trained to develop and use these approaches. This work can only be done in the context of real biological problems.

However, currently the majority of software-based research applications for the natural sciences continue to be developed by a single individual (post-doc or doctoral student) for single-purpose use (their own research). At best it is developed in-house within research groups for a specific, immediate in-house purpose. As such little thought is given to its long-

term sustainability, utility or extensibility outside of the immediate application domain. There has been virtually no cross-over from software development methods and infrastructures used in industry to those used in academia. This programme of research aims to initiate a radical alteration in this situation making it far easier for researchers to utilise experimental data sources to build and validate mathematical and computational models, and to compare competing modelling paradigms, within a consistent computational framework. Development of solutions to the complex visualisation problems that necessarily arise will be central to the success of the programme.

## Working at the University of Oxford

For further information about working at Oxford, please see:

[http://www.ox.ac.uk/about\\_the\\_university/jobs/research/](http://www.ox.ac.uk/about_the_university/jobs/research/)

### Salary and Benefits

The post, which is a fixed term appointment for up to three years (with the possibility of extension for a further 2 years), has a salary on the University grade 07S scale (currently £29,099 to £35,788), includes membership of the University Superannuation Scheme (USS) and has an annual leave entitlement of 38 days per year (inclusive of all public holidays and university closed periods).

### How to apply

If you consider that you meet the selection criteria, click on the **Apply Now** button on the 'Job Details' page and follow the on-screen instructions to register as a user. You will then be required to complete a number of screens with your application details, relating to your skills and experience. When prompted, please provide details of two referees and indicate whether we can contact them at this stage. You will also be required to upload a CV and supporting statement. The supporting statement should describe what you have been doing over at least the last 10 years. This may have been employment, education, or you may have taken time away from these activities in order to raise a family, care for a dependant, or travel for example. Your application will be judged solely on the basis of how you demonstrate that that you meet the selection criteria outlined above and we are happy to consider evidence of transferable skills or experience which you may have gained outside the context of paid employment or education.

Please save all uploaded documents to show your name and the document type.

All applications must be received by **midday** on the closing date stated in the online advertisement.

Candidates must also ask their referees to consider this job description and email their reference directly to [job08@cs.ox.ac.uk](mailto:job08@cs.ox.ac.uk) or, alternatively, post or fax it to: The Administrator, Department of Computer Science, Wolfson Building, Parks Road, Oxford OX1 3QD, such that the reference arrives by, or shortly after, the advertised closing date.

Should you experience any difficulties using the online application system, please email [recruitment.support@admin.ox.ac.uk](mailto:recruitment.support@admin.ox.ac.uk)

To return to the online application at any stage, please click on the following link [www.recruit.ox.ac.uk](http://www.recruit.ox.ac.uk)

Please note that you will be notified of the progress of your application by automatic e-mails from our e-recruitment system. **Please check your spam/junk mail** regularly to ensure that you receive all e-mails.