



**MATHEMATICAL INSTITUTE**  
ANDREW WILES BUILDING

## Job Description and Selection Criteria

<b>Job title</b>	Postdoctoral Research Associate in Mathematical Modelling of Osteoarthritis (1 post)
<b>Division</b>	Mathematical, Physical and Life Sciences
<b>Department</b>	Mathematical Institute
<b>Location</b>	Andrew Wiles Building, Radcliffe Observatory Quarter, Woodstock Road, Oxford, OX2 6GG
<b>Grade and salary</b>	Grade 7: £41,636 - £47,779 per annum
<b>Hours</b>	Full time
<b>Contract type</b>	Fixed-term (3 years)
<b>Reporting to</b>	Professor Helen Byrne
<b>Vacancy reference</b>	<b>187341</b>
<b>Additional information</b>	<p>This is a full-time position that cannot be held concurrently with any other substantive post without the explicit permission of the Head of Department.</p> <p>This post is subject to a 12-month probationary period.</p> <p>The post is available immediately and is funded by the GSK-Imperial-Oxford Modelling Informed Medicine Centre.</p> <p><b>(PLEASE NOTE: Applicants are responsible for contacting two of their referees and making sure that their letters are sent to <a href="mailto:references@maths.ox.ac.uk">references@maths.ox.ac.uk</a> by the closing date.)</b></p>
<b>Principal Investigator / supervisor</b>	Professor Helen Byrne



## The role

We invite applications for a Postdoctoral Research Associate to undertake research on mathematical modelling of osteoarthritis at the Mathematical Institute, University of Oxford. This is a three-year, fixed term position, funded by the GSK-Imperial-Oxford Modelling-Informed Medicine Centre (MiMeC) and is available immediately. The post sits within the MiMeC Osteoarthritis research theme, led by Professors Helen Byrne and Tonia Vincent (Oxford) and Dr Grant Generaux (GSK), with additional support from Professor Philip Maini (Oxford), Prabhakar Pandian (GSK) and John Kreeger (GSK).

Osteoarthritis (OA) is a progressive degenerative joint disease. It causes pain, loss of function, and disability, and is a leading cause of premature work loss worldwide. Almost 600 million people were affected in 2020 and prevalence is projected to reach 1 billion by 2050. Despite this growing burden, there are currently no licenced treatments, highlighting a critical unmet need for disease-modifying therapies grounded in a deeper mechanistic understanding of OA progression. OA progression is driven by tightly coupled **mechanical, biochemical, and cellular processes**, with **chondrocytes**, resident cells of articular cartilage, playing a key role in regulating extracellular matrix turnover. Mechanical injury, often on a background of systemic inflammation caused by obesity and ageing, leads to chondrocytes switching from a healthy, homeostatic phenotype to a mechano-activated phenotype driving cartilage degeneration and altered tissue mechanics. The aim of this project is to use mathematical modelling to understand how these multiscale feedbacks affect disease progression and to develop a computational framework for the design and evaluation of disease-modifying therapies.

The aim of this post is to develop a multiscale mathematical model to understand how injury-induced mechanical and biochemical stimuli drive cartilage cells to transition from mature, terminally differentiated chondrocytes to altered phenotypes that promote cartilage degeneration. Initially, the postdoctoral researcher will develop a model describing chondrocyte responses to mechanical and biochemical cues, integrating established subcellular signalling pathways that regulate switching between homeostatic and mechano-activated states. The model will be validated against existing datasets and experimental data generated by Professor Vincent's group at the Kennedy Institute for Rheumatology. In the longer term, the mathematical model will be extended to include biomechanical properties of the pericellular and territorial matrix of healthy and diseased cartilage to investigate the co-evolution of chondrocyte phenotype and microenvir during OA progression and in response to treatment.

The successful candidate will be expected to conduct research both independently and collaboratively with other researchers at Oxford and elsewhere (e.g. GSK). They are expected to provide informal mentorship of doctoral students in the group, and will have the opportunity to co-supervise doctoral students working on MiMeC-related projects. This position is well-suited to researchers with strong modelling and computational skills and provides the opportunity to undertake research with the potential for substantial positive real-world impacts.

## Flexible working

This position is a full-time role. The postdoctoral research associate will be assigned a desk in the Mathematical Institute. We have a number of family-friendly policies, such as the right to apply for flexible working, hybrid working, and support for staff returning from periods of extended absence.

## Responsibilities

The successful candidate will be expected to:

- Manage their own academic research and administrative activities. This involves small scale project management and co-ordination of multiple aspects of work to meet deadlines.
- Develop and analyse mathematical and computational models of osteoarthritis and therapeutic intervention.
- Parameterise and validate the models that they develop using real-world data and then use the models to test different strategies for treatment.
- Co-supervise DPhil students working on MiMeC-related projects.
- Develop ideas for generating research income within the scope of the MiMeC Osteoarthritis research theme.
- Collaborate and lead in the preparation of research publications and contribute towards ensuring that the models developed are usable by industry colleagues and public health policy advisors.
- Present papers at conferences or workshops.
- Act as a source of information and advice to other members of the group on methodologies or other disease modelling research.
- Represent the research group at external meetings/seminars, either with other members of the group or alone.
- Carry out collaborative projects with colleagues in partner institutions and research groups, including with project members at GSK.

It is the policy of the Mathematical Institute to give all PDRAs the opportunity to teach, where the conditions of the grant allow this, and to require teaching if there is a departmental need. Such teaching, if undertaken, will not exceed 3 hours per week for 24 weeks of the year and additional remuneration will be paid. It will normally be delivered as classes, but it might also involve giving lectures or college tutorials.

## Selection criteria

Your application will be judged only against the criteria that are set out below. You should ensure that your application shows clearly how your skills and experience meet these criteria.

The University is committed to fairness, consistency and transparency in selection decisions. Members of the selection committee are aware of the principles of equality of opportunity, fair selection and the risks of bias.

If, for any reason, you have taken a career break, parental leave or have had an atypical career and wish to disclose this in your application, the selection committee will take this into account, recognising that the quantity of your experience may be reduced as a result.

### ***Essential selection criteria***

The successful candidate will be expected to meet the following criteria:

1. Hold, or be close to completing, a PhD/DPhil in Mathematics, Engineering or a related discipline.
2. Experience of developing and analysing mathematical models of biological systems, using numerical and analytical methods.
3. Ability to manage own academic research and associated activities.
4. Previous experience of writing peer-reviewed publications in internationally leading scientific journals.
5. Ability to contribute ideas for new research projects.
6. Excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings with external partners.
7. Experience of working both independently and collaboratively.
8. A commitment to demonstrating respect, courtesy and consideration within interactions with members of the University community.

### ***Desirable selection criteria***

1. Ability to write high quality computing code in C++ or other appropriate programming languages, for use by others.
2. Experience of multiscale modelling of biological systems.
3. Experience of working as part of a multidisciplinary team, in collaboration with experimentalists, clinicians and/or pharma.
4. Experience of supervising short research projects.
5. Experience of promoting collaborative research environments for people from different backgrounds.

## Pre-employment screening

### Standard checks

If you are offered the post, the offer will be subject to standard pre-employment checks. You will be asked to provide: proof of your right-to-work in the UK; proof of your identity; and (if we haven't done so already) we will contact the referees you have nominated. You will also be asked to complete a health declaration so that you can tell us about any health conditions or disabilities for which you may need us to make appropriate adjustments.

Please read the candidate notes on the University's pre-employment screening procedures at: <https://www.jobs.ox.ac.uk/pre-employment-checks>

## About the University of Oxford

Welcome to the University of Oxford. We aim to lead the world in research and education for the benefit of society both in the UK and globally. Oxford's researchers engage with academic, commercial and cultural partners across the world to stimulate high-quality research and enable innovation through a broad range of social, policy and economic impacts.

We believe our strengths lie both in empowering individuals and teams to address fundamental questions of global significance, while providing all our staff with a welcoming and inclusive workplace that enables everyone to develop and do their best work. Recognising that diversity is our strength, vital for innovation and creativity, we aspire to build a truly diverse community which values and respects every individual's unique contribution.

While we have long traditions of scholarship, we are also forward-looking, creative and cutting-edge. Oxford is one of Europe's most entrepreneurial universities and we rank first in the UK for university spin-outs, and in recent years we have spun out 15-20 new companies every year. We are also recognised as leaders in support for social enterprise.

Join us and you will find a unique, democratic and international community, a great range of staff benefits and access to a vibrant array of cultural activities in the beautiful city of Oxford.

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

## The Mathematical Institute

The Mathematical Institute, as Oxford's Department of Mathematics is known, is one of the leading mathematics departments in the world. Our mathematical research, impact and environment have twice been ranked first in the UK, in the 2021 and 2014 Research Excellence Framework exercises, a government review of research in all UK universities. The Mathematical Institute is the focus of research into both fundamental mathematics and its applications, and our inclusive nature and overall size are key factors in the provision of an outstanding research environment for our members. The large number of faculty, postdocs and students in the Mathematical Institute, all supported by excellent facilities, allows us to maintain a critical mass in research groups encompassing a wide spectrum of mathematics, while our integrated nature fosters collaboration between fields. We also host a large number of academic visitors. Our web pages ([www.maths.ox.ac.uk](http://www.maths.ox.ac.uk)) provide comprehensive information about our activities.

The research activities of the Institute as a whole can be gauged from the web pages of the research groups and centres within the Institute ([www.maths.ox.ac.uk/research](http://www.maths.ox.ac.uk/research)). The range of our research interests is well reflected by the profile of our faculty as listed at [www.maths.ox.ac.uk/people](http://www.maths.ox.ac.uk/people). Many

members of the Institute have received prestigious prizes and other special recognition for their work; some recent examples can be found at [www.maths.ox.ac.uk/news](http://www.maths.ox.ac.uk/news).

The Mathematical Institute moved into the purpose-built Andrew Wiles Building in the University's Radcliffe Observatory Quarter in September 2013. As well as providing offices for all staff and graduate students, it houses a range of other facilities available to members of the department, including the Whitehead Library, a large range of meeting rooms, teaching spaces, lecture rooms, and social spaces, and a small laboratory for carrying out table-top experiments. For more information, see [www.maths.ox.ac.uk/about-us](http://www.maths.ox.ac.uk/about-us).

Teaching is central to the life of the Mathematical Institute, and we have around 900 undergraduates on course, some on joint courses with other departments. We teach around 250 students each year across five taught master's degree courses and have over 250 doctoral students in residence at any one time. Our doctoral programme always attracts the best research students from across the world, and we have a broad mentoring and training programme.

The Mathematical Institute strives to ensure that all staff and students are given the opportunities and support they need to achieve their potential. We are committed to equality of opportunities and to advancing women's careers. We support staff returning from long-term absence with teaching relief, offer flexible working arrangements, and the department sponsors University nursery places to support the priority allocation of childcare to our staff. Further information about family support can be found below under University Benefits, Terms and Conditions. Our [Equality, Diversity & Inclusion Committee](#)<sup>1</sup> contributes to many aspects of our work.

As part of the department's commitment to openness, inclusivity and transparency, we strongly encourage applications from all who consider they meet the requirements of the post, and particularly from women and ethnic minorities.

We have a number of family-friendly policies, such as the right to apply for flexible working, hybrid working, and support for staff returning from periods of extended absence. We are committed to ensuring an inclusive interview process and will reimburse up to £250 towards any additional care costs (for a dependent child or adult) incurred as a result of attending an interview for this position, which may not be applicable if the interviews are held remotely.

For more information on the Mathematical Institute, please visit: [www.maths.ox.ac.uk](http://www.maths.ox.ac.uk)

The Mathematical Institute holds a silver Athena Swan award to recognise advancement of gender equality: representation, progression and success for all.

## **The Mathematical, Physical and Life Sciences Division**

Oxford is widely regarded as one of the world's leading science universities, and the University's Mathematical, Physical and Life Sciences (MPLS) Division sits at the heart of this reputation. It offers an outstanding environment for research, teaching, and innovation across the mathematical, computational, physical, engineering, and life sciences. As one of the four academic divisions of the University of Oxford, encompassing nine academic departments, a Doctoral Training Centre and Begbroke Science Park, it

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<sup>1</sup> The Mathematical Institute was a founding supporter of the London Mathematical Society's Good Practice Scheme ([www.lms.ac.uk/women/good-practice-scheme](http://www.lms.ac.uk/women/good-practice-scheme)). We have held an Athena SWAN Silver Award since 2016.

provides a collaborative, interdisciplinary community with a vibrant network of leading researchers and educators.

The division's research outputs, environment, and impact are consistently recognised at the highest levels, both nationally and internationally. MPLS departments regularly appear at the top of global league tables, including the Times Higher Education and QS World Rankings. Our strong performances in the UK Research Excellence Framework in both 2014 and 2021 also highlight the quality and impact of our work. These achievements reflect not only our academic excellence but also the strong networks we foster—with industrial partners, policymakers, and global research institutions.

Our vibrant research environment continues to evolve with major new investments in infrastructure. The Life and Mind Building, the University's largest-ever building project, is now close to completion/opened in 2025. It provides purpose-built facilities for the Departments of Experimental Psychology and Biology in inspiring spaces designed to foster collaboration and brings together researchers working on some of the most pressing questions in life sciences and human behaviour. The striking new Andrew Wiles Building houses our Mathematical Institute next to the Schwarzman Humanities Building, and the Beecroft on the edge of University Parks has provided a transformative home for our physicists. Current plans include significant investment to expand our interdisciplinary research and innovation support facilities at Begbroke Science Park and to transform Osney Mead, to the west of the city centre, into a dynamic innovation district, further strengthening Oxford's position as a world leader in science, technology, and enterprise.

MPLS provides a supportive and inclusive environment for academics at every career stage, from all over the world. The Division has a strong tradition of securing prestigious fellowships and supporting researchers as they progress to leadership roles. We are proud of our diverse community and every department holds an Athena Swan Award.

For educators, Oxford's tutorial system offers an unparalleled opportunity to engage with talented students and contribute to one of the world's most respected teaching systems. The division plays a central role in shaping the future of science through its graduate programmes, with over 3,500 postgraduate students receiving rigorous training and mentorship across MPLS departments.

For more information about the MPLS Division and the dedicated professional support it provides to academics across the sciences, please visit: <http://www.mpls.ox.ac.uk>.

Further details of all the research groups at the Mathematical Institute can be found here: <https://www.maths.ox.ac.uk/research>.

## How to Apply

Applications are made through our online recruitment portal. Information about how to apply is available on our Jobs website <https://www.jobs.ox.ac.uk/how-to-apply>.

Your application will be judged solely on the basis of how you demonstrate that you meet the selection criteria stated in the job description.

You will also be required to upload the following as a single pdf:

- **A curriculum vitae**
- **A list of publications (please include a link to each publication)**
- **A statement of research interests (a maximum of two pages)**
- **A supporting statement (a maximum of two pages)**

The supporting statement must explain how you meet each of the selection criteria for the post using examples of your skills and experience. This may include experience gained in employment, education, or during career breaks (such as time out to care for dependants).

Please upload all documents as **PDF files** with your name and the document type in the filename, quoting vacancy reference **187341**.

**Letters of reference must be submitted by two referees before the deadline. Applicants should ask their referees to send their letters of reference DIRECTLY to the Recruitment Coordinator, email: [references@maths.ox.ac.uk](mailto:references@maths.ox.ac.uk) by the closing date** (a letter by email is sufficient) **quoting the vacancy reference 187341**.

Referees should preferably not all be from the same institution and whenever possible one should be the applicant's current, or most recent, supervisor.

All applications must be received by **12.00 noon** UK time on the advertised closing date for this post.

Online interviews are anticipated to take place on the 28 August 2026.

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## Information for priority candidates

A priority candidate is a University employee who is seeking redeployment because they have been advised that they are at risk of redundancy, or on grounds of ill-health/disability. Priority candidates are issued with a redeployment letter by their employing department(s).

If you are a priority candidate, please ensure that you attach your redeployment letter to your application (or email it to the contact address on the advert if the application form used for the vacancy does not allow attachments).

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**DATA PROTECTION:** All data supplied by applicants will be used only for the purposes of determining their suitability for the post, and will be held in accordance with the principles of the Data Protection Act 1998 and the department's data protection policy.

<https://www.maths.ox.ac.uk/members/policies/data-protection/statement>

Due to the large volume of recruitment that the department administers we are unable to provide feedback to non-shortlisted applicants.

## If you need help

Application FAQs, including technical troubleshooting advice is available at: <https://staff.web.ox.ac.uk/recruitment-support-faqs>

Non-technical questions about this job should be addressed to the recruiting department directly at [vacancies@maths.ox.ac.uk](mailto:vacancies@maths.ox.ac.uk).

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

Please note that you will receive an automated email from our online recruitment portal to confirm receipt of your application. **Please check your spam/junk mail** if you do not receive this email.

## Important information for candidates

### Data Privacy

Please note that any personal data submitted to the University as part of the job application process will be processed in accordance with the GDPR and related UK data protection legislation. For further information, please see the University's Privacy Notice for Job Applicants at: <https://compliance.admin.ox.ac.uk/job-applicant-privacy-policy>. The University's Policy on Data Protection is available at: <https://compliance.admin.ox.ac.uk/data-protection-policy>.

### The University's policy on retirement

The University operates an Employer Justified Retirement Age (EJRA) for very senior research posts at **grade RSIV/D35 and clinical equivalents E62 and E82**, which with effect from 1 October 2023 will be 30 September before the 70<sup>th</sup> birthday. The justification for this is explained at: <https://hr.admin.ox.ac.uk/the-ejra>.

For **existing** employees on these grades, any employment beyond the retirement age is subject to approval through the procedures: <https://hr.admin.ox.ac.uk/the-ejra>.

There is no normal or fixed age at which staff in posts at other grades have to retire. Staff at these grades may elect to retire in accordance with the rules of the applicable pension scheme, as may be amended from time to time.

### Equality of opportunity

The University of Oxford is committed to equal opportunity, and to being an inclusive institution where everyone belongs and is supported to succeed. We recognise how the diversity of our community enriches our ability to deliver on our academic mission.

We welcome applications from individuals from all backgrounds, including those under-represented within higher education. No applicant or members of staff shall be unlawfully discriminated against on the basis of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.

Recruitment, progression within employment and retention will be determined according to personal merit and the duties and requirements of the post. In all cases, the primary consideration will be the ability to perform the job.

Our commitment to equality and diversity goes hand in hand with our commitment to academic freedom and freedom of speech, as stated in the University's Equality Policy and Equality, Diversity and Inclusion Strategic Plan.

## Benefits of working at the University

### Employee benefits

University employees enjoy 38 days' paid holiday, generous pension schemes, travel discounts, and a variety of professional development opportunities. Our range of other employee benefits and discounts also includes free entry to the Botanic Gardens and University colleges, and discounts at University museums. See <https://hr.admin.ox.ac.uk/staff-benefits>

### Employee Assistance Programme

As part of our wellbeing offering staff get free access to Spectrum.Life, a confidential employee assistance programme, available 24/7 for 365 days a year. Find out more <https://staff.admin.ox.ac.uk/spectrum.life>.

### University Club and sports facilities

Membership of the University Club is free for all University staff. The University Club offers social, sporting, and hospitality facilities. Staff can also use the University Sports Centre on Iffley Road at discounted rates, including a fitness centre, powerlifting room, and swimming pool. See [www.club.ox.ac.uk](http://www.club.ox.ac.uk) and <https://www.sport.ox.ac.uk/>.

### Information for staff new to Oxford

If you are relocating to Oxfordshire from overseas or elsewhere in the UK, the University's Welcome Service website includes practical information about settling in the area, including advice on relocation, accommodation, and local schools. See <https://welcome.ox.ac.uk/>

There is also a visa loan scheme to cover the costs of UK visa applications for staff and their dependents. See <https://staffimmigration.admin.ox.ac.uk/visa-loan-scheme>.

### Family-friendly benefits

We are a family-friendly employer with one of the most generous family leave schemes in the Higher Education sector (see <https://hr.web.ox.ac.uk/family-leave>). Our Childcare Services team provides guidance and support on childcare provision, and offers a range of high-quality childcare options at affordable prices for staff. In addition to 5 University nurseries, we partner with a number of local providers to offer in excess of 450 full time nursery places to our staff. Eligible parents are able to pay for childcare through salary sacrifice, further reducing costs. See <https://childcare.admin.ox.ac.uk/>.

### Supporting disability and health-related issues (inc menopause)

We are committed to supporting members of staff with disabilities or long-term health conditions, including those experiencing negative effects of menopause. Information about the University's Staff Disability Advisor, is at <https://edu.admin.ox.ac.uk/disability-support>. For information about how we support those going through menopause see <https://hr.admin.ox.ac.uk/menopause-guidance>.

### Staff networks

The University has a number of staff networks including the Oxford Research Staff Society, BME staff network, LGBT+ staff network and a disabled staff network. You can find more information at <https://edu.admin.ox.ac.uk/networks>

### The University of Oxford Newcomers' Club

The University of Oxford Newcomers' Club is an organisation run by volunteers that aims to assist the partners of new staff settle into Oxford, and provides them with an opportunity to meet people and make connections in the local area. See [www.newcomers.ox.ac.uk](http://www.newcomers.ox.ac.uk).

### Research Staff

The Researcher Hub supports all researchers on fixed-term contracts. They aim to help you settle in comfortably, make connections, grow as a person, extend your research expertise and approach your next career step with confidence. Find out more <https://www.ox.ac.uk/research/support-researchers/researcher-hub>

Oxford's Research Staff Society is a collective voice for our researchers. They also organise social and professional networking activities for researchers. Find out more <https://www.ox.ac.uk/research/support-researchers/connecting-other-researchers/oxfordresearch-staff-society>