Job Description and Selection Criteria

<table>
<thead>
<tr>
<th>Job title</th>
<th>Postdoctoral Research Assistant in Mathematical Modelling of Engineered Tissues</th>
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<tbody>
<tr>
<td>Division</td>
<td>Mathematical, Physical and Life Sciences</td>
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<tr>
<td>Department</td>
<td>Mathematical Institute</td>
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<tr>
<td>Location</td>
<td>Andrew Wiles Building, Radcliffe Observatory Quarter, Woodstock Road, Oxford, OX2 6GG</td>
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<tr>
<td>Grade and salary</td>
<td>Grade 7: salary £31,604 - £38,833 p.a.</td>
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<tr>
<td>Hours</td>
<td>Full time</td>
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<tr>
<td>Contract type</td>
<td>2 years Fixed-term</td>
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<tr>
<td>Reporting to</td>
<td>Professor Sarah Waters</td>
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<tr>
<td>Vacancy reference</td>
<td>134884</td>
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<td>Additional information</td>
<td>These are full-time positions that cannot be held concurrently with any other substantive post without the explicit permission of the Head of Department. This position is subject to a 9 month probationary period. This position is funded by EPSRC. (PLEASE NOTE: Applicants are responsible for contacting their referees and making sure that their letters are received by the closing date)</td>
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The Role

We invite applications for a Postdoctoral Research Assistant position to work with Professor Sarah Waters at the Mathematical Institute, University of Oxford, on an exciting project to develop new mathematical models for engineering tissues in regenerative medicine. The postholder will be based in the group of Sarah Waters, part of the Oxford Centre for Industrial and Applied Mathematics, in the Mathematical Institute.

This post is part of a multi-disciplinary, multi-site EPSRC-funded collaborative project involving researchers at the Universities of Birmingham (lead: Professor Alicia El Haj), Keele (lead: Professor Ying Yang, Institute for Science and Technology in Medicine) and Edinburgh.
Engineering tissues involves seeding cells within a deformable porous bioactive matrix which is then cultured within a bioreactor filled with culture media. Bioreactors are employed to promote the development and maturation of engineered tissues by recreating in vitro the complex biomechanical and biochemical cellular environment that promotes tissue repair and formation in vivo. To achieve the goal of tissue engineered products successfully reaching the clinic, nondestructive characterization techniques are necessary to monitor the dynamic spatial mechanical properties of the tissue construct in real time as it matures. To address this challenge, we aim to design a novel multi-model bioreactor technology, which combines imaging with a bioreactor environment for the maturation and monitoring of tissue constructs. Our novel technology will provide a sterile growth environment for soft and hard tissue engineering constructs where mechanical loading can be applied, building on the Hydrostatic Pressure (HP) bioreactor developed at Keele University. The HP Bioreactor has been demonstrated to apply physiological growth environments across multiple formats including collagen hydrogels. Our bioreactor technology will enable the optimization of tissue engineering protocols, facilitating the translation of engineered products to the clinic, and provide a unique tool for tissue engineering research.

The postholder will develop, analyse and solve new mathematical models for the engineering of artificial tissue within our novel multi-modal bioreactor technology. By combining mechanistic mathematical modelling with state-of-the-art elastography/optical imaging will we quantitatively determine the cellular biomechanical environment, and monitor the changing spatial mechanical properties in real time as the tissue construct develops and matures. We will develop continuum models to provide quantitative predictions of the biomechanical stress distribution throughout the tissue construct given experimentally measured displacement maps. To validate our approach we will first consider the local mechanical environment (fluid shear stress and pressure, elastic stresses etc) of test samples (purely elastic and poroelastic) in the HP bioreactor. We will then apply the approach to biological tissues, using osteo-chondral constructs as our exemplar.

Applicants should have expertise in the mathematical modelling of physical systems, partial differential equations (PDEs), and skills for solving PDEs with either analytical or numerical methods. The post holder will report directly Professor Sarah Waters and be based in the Mathematical Institute. There will be a large amount of interaction between all the team members of this project (at Oxford, Birmingham, Edinburgh and Keele) and the successful candidate will be central to driving these interactions. This will require some traveling by the postholder to Birmingham, Edinburgh and Keele Universities for discussions, as well as opportunities for research secondments to these Universities. The postholder will also provide guidance to junior members of the research group including doctoral students.

**Responsibilities**

The successful candidates will perform mathematical research on the project and will be expected to:

- Undertake high-quality, independent research under the leadership of Professor Sarah Waters, in collaboration with Birmingham University (lead: Professor Alicia El Haj), Edinburgh University (lead: Professor Bagnanichhi) and Keele University (lead: Professor Ying Yang)
• Manage own academic research and administrative activities as well as coordinate research activities with other parts of the interdisciplinary research project. This involves small scale project management, to co-ordinate multiple aspects of work to meet deadlines

• Adapt existing and develop new research methodologies

• Prepare working theories and analyse qualitative and/or quantitative data from a variety of sources, reviewing and refining theories as appropriate

• Contribute ideas for new research projects

• Collaborate in the preparation of research publications, and book chapters

• Present papers at conferences or public meetings

• Act as a source of information and advice to other members of the group on methodologies or procedures

• Represent the research group at external meetings/seminars, particularly the meetings of all researchers on this multidisciplinary, multi-site project

• Carry out collaborative projects with colleagues in Birmingham, Edinburgh and Keele Universities

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

Applicants will be expected to

• have, or be close to completing, a PhD in mathematics or a related discipline;

• have expertise in modelling physical systems using analytical or numerical approaches for solving PDEs;

• possess sufficient specialist knowledge in the discipline to work within established research programmes;

• have the ability to manage their own academic research and associated activities;

• have a good track record (for the stage of their career) of publications in leading international journals;

• have the ability to contribute ideas for new research projects;

• have the ability to work as part of an interdisciplinary team;

• have excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings.
Desirable selection criteria

- Experience of modelling problems related to tissue biomechanics or tissue engineering
- Experience of independently managing a discrete area of a research project

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. Income from external research contracts in 2014/15 exceeded £522.9m and we rank first in the UK for university spin-outs, with more than 130 companies created to date. 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

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 were all ranked first in the UK in the 2014 Research Excellence Framework exercise, 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) provide comprehensive information about all of 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). The range of our research interests is well reflected by the profile of our faculty as listed at 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/awards-and-prizes.

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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 facility for carrying out table-top experiments. For more information, see www.maths.ox.ac.uk/about-us.

Teaching is central to the life of the Mathematical Institute and we have an annual intake of approximately 300 undergraduates, some on courses jointly with other departments. We admit 100 students each year across five taught master’s degree courses and have over 230 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. Our provision expanded in 2014 following the award of two EPSRC-funded Centres for Doctoral Training.

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 and provide flexible arrangements for staff with parental responsibilities. Further information about family support can be found in the Standard Terms and Conditions. Our Good Practice Committee1 contributes to many aspects of our work, see www.maths.ox.ac.uk/members/good-practice.

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.

**MPLS Division**

The university’s Division of Mathematical Physical and Life Sciences contains departments that span the full spectrum of the mathematical, computational, physical, engineering and life sciences. Between them, they undertake a huge range of fundamental research and develop application that respond to the great societal and technological challenges of our time. Research across the Division is increasingly interdisciplinary in nature.

MPLS’s scientists collaborate closely with colleagues in other Divisions across Oxford, with other universities, research organisations and industrial partners across the globe.

Our senior researchers have been awarded some of the most significant scientific honours (including Nobel prizes and prestigious titles such as FRS and FREng). The Division is equally proud of its tradition of attracting and nurturing the very best early career researchers, many of whom regularly secure prestigious fellowships.

The Division holds six Athena Swan Awards (four silver and two bronze) illustrating its commitment to encouraging women in science research and careers.

For more information visit [http://www.mpls.ox.ac.uk/about/about-mpls-division](http://www.mpls.ox.ac.uk/about/about-mpls-division)

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1 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)) and have recently been awarded an Athena SWAN silver award.

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How to apply

Before submitting an application, you may find it helpful to read the ‘Tips on applying for a job at the University of Oxford’ document, at [https://www.ox.ac.uk/about/jobs/research/](https://www.ox.ac.uk/about/jobs/research/)

If you would like to apply, click on the Apply Now button on the ‘Job Details’ page and follow the on-screen instructions to register as a new user or log-in if you have applied previously. You will also be required to upload a curriculum vitae, list of publications, a statement of research interests and supporting statement. The supporting statement should describe how you meet the selection criteria outlined in the job description.

Please also provide details of two referees, one should include the applicant’s current or most recent employer, whenever possible and indicate whether we can contact them now.

Please upload all documents as PDF files with your name and the document type in the filename.

Applicants should ask their referees to send their letters of reference DIRECTLY to

The Recruitment Administrator (Vacancies)
The Mathematical Institute, Andrew Wiles Building, Radcliffe Observatory Quarter, Woodstock Road, Oxford, OX2 6GG. Tel: 01865 273525: Email: vacancies@maths.ox.ac.uk

by the closing date (a letter by email is sufficient) quoting the vacancy reference 134884
Referees should preferably not, all be from the same institution and whenever possible one should be the applicant’s current, or most recent, supervisor. NOTE: reference letters must be received from your referees by the closing date for your application to be complete.

All applications must be received by 12:00 noon UK time on Friday 22\textsuperscript{nd} June 2018

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 departments.

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)

Should you experience any difficulties using the online application system, please email recruitment.support@admin.ox.ac.uk. Further help and support is available from [www.ox.ac.uk/about_the_university/jobs/support/](http://www.ox.ac.uk/about_the_university/jobs/support/). 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 be notified of the progress of your application by automatic emails from our e-recruitment system. Please check your spam/junk mail regularly to ensure that you receive all emails.
Important information for candidates

Pre-employment screening

Please note that the appointment of the successful candidate will be subject to standard pre-employment screening, as applicable to the post. This will include right-to-work, proof of identity and references. We advise all applicants to read the candidate notes on the University's pre-employment screening procedures, found at: www.ox.ac.uk/about/jobs/preemploymentscreening/.

The University’s policy on retirement

The University operates an Employer Justified Retirement Age (EJRA) for all academic posts and some academic-related posts. From 1 October 2017, the University has adopted an EJRA of 30 September before the 69th birthday for all academic and academic-related staff in posts at grade 8 and above. The justification for this is explained at: www.admin.ox.ac.uk/personnel/end/retirement/acrelretire8/+.

For existing employees, any employment beyond the retirement age is subject to approval through the procedures: www.admin.ox.ac.uk/personnel/end/retirement/acrelretire8/+.

From 1 October 2017, there is no normal or fixed age at which staff in posts at grades 1–7 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

Entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. No applicant or member of staff shall be discriminated against because of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.
Benefits of working at the University

University Club and sports facilities
The University Club provides social, sporting and hospitality facilities. It incorporates a bar, café and sporting facilities, including a gym. 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 [www.sport.ox.ac.uk/oxford-university-sports-facilities](http://www.sport.ox.ac.uk/oxford-university-sports-facilities).

Information for international staff (or those relocating from another part of the UK)
If you are relocating to Oxfordshire from overseas, or elsewhere in the UK, the University's International Staff website includes practical information related to moving to and settling in Oxford such as advice on immigration, relocation, accommodation, or registering with a doctor.
See: [www.internationalstaffwelcome.admin.ox.ac.uk/](http://www.internationalstaffwelcome.admin.ox.ac.uk/)

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 to settle into Oxford and to provide them with an opportunity to meet people in the area. See [www.newcomers.ox.ac.uk/](http://www.newcomers.ox.ac.uk/)

Childcare
The University has excellent childcare services with five University nurseries, as well as University-supported places at many other private nurseries.
For full details including how to apply and the costs, see [www.admin.ox.ac.uk/childcare](http://www.admin.ox.ac.uk/childcare).

Family-friendly benefits
The University subscribes to My Family Care ([www.admin.ox.ac.uk/personnel/staffinfo/benefits/family/mfc/](http://www.admin.ox.ac.uk/personnel/staffinfo/benefits/family/mfc/)) and staff are eligible to register for emergency back-up childcare and adultcare services, a 'speak to an expert' phone line and a wide range of guides and webinars through a website called the Work + Family space.

Disabled staff
We are committed to supporting members of staff with disabilities or long-term health conditions. Please visit [www.admin.ox.ac.uk/eop/disab/staff](http://www.admin.ox.ac.uk/eop/disab/staff) for further details including information about how to make contact, in confidence, with the University’s Staff Disability Advisor.

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 [www.admin.ox.ac.uk/eop/inpractice/networks/](http://www.admin.ox.ac.uk/eop/inpractice/networks/)

Other benefits
Staff can enjoy a range of other benefits such as free visitor access to the University’s colleges and the Botanic Gardens as well as a range of discounts.
See [www.admin.ox.ac.uk/personnel/staffinfo/benefits](http://www.admin.ox.ac.uk/personnel/staffinfo/benefits)