Personal details

Personal details

First / given name	Yichi
Second given name	
Third given name	
Surname/family name	Zhang
Date of birth	28 May 2002
Preferred first/given name	Richard
Previous surname	
Country of birth	China
Legal nationality	British National
Dual nationality	
Country of residence	United Kingdom
Have you previously studied with us at the University of Bristol?	No

Contact details

Home address

Please provide your permanent residential address. If you have another address and would prefer for us to contact you at that address instead you have the opportunity to add a correspondence address in the next section.

Country	United Kingdom
Postcode	SW20 0LQ
Address Line 1	21 Amity Grove
Address Line 2	
City	London
County	
Telephone	

If you would like us to send any postal correspondence to an address which is not your home address please enter an alternative address here. If you want us to send correspondence to your home address then please select No.

Do you want to add a correspondence address?	No
Country	United Kingdom
Postcode	SW20 0LQ
Address Line 1	21 Amity Grove
Address Line 2	
City	London
County	
Telephone	

Agent

Agent details

Agency Name	
Email address	

Other information

Additional Documents

Please upload required documents as outlined in your admissions statement

Mode of study

How would like to study this programme?	Full Time

Qualifications

Qualifications

Institution	Qualification	Type	Subject	Actual/predicted	Grade	Start date	End date
University of Oxford	Master's Degree (PG)	Academic Qualification	Mathematics	Predicted	First Class	11/Oct/2020	30/Jun/2025

If these qualifications have altered since your last application please note the changes in the free text box here.

English Language

Is English your first language? Yes
What is your first language?
Did you study at school/university where you were taught in English?
For how many years?
Have you sat a relevant English language test?

TOEFL (internet-based)

Registration number
Date of TOEFL test
TOEFL reading score
TOEFL listening score
TOEFL speaking score
TOEFL writing score
TOEFL total score

IELTS (International English Language Testing System)

Test report form (TRF) number
UKVI number (if applicable)
Date of IELTS test
IELTS listening score
IELTS reading score
IELTS writing score
IELTS speaking score
IELTS total score

Pearson Test of English

Score report code
Date of Pearson test
Pearson listening score
Pearson reading score
Pearson speaking score
Pearson writing score
Pearson overall score

Other English Language test

Name of course

Registration number	
Date of test	
Listening score	
Writing score	
Reading score	
Total score	

Experience

Current Employer

Employer name and address	Department of Statistics, University of Oxford 24-29 St Giles', Oxford, OX1 3LB
Job title and main duties	Research assistant. Ran and maintained code in a high performance computing cluster to map short read genetic data, and perform BGC (biased gene conversion) and GC-BGC analysis.
Full time/Part time	Full time
Date of Appointment	18 July 2022
End date (if applicable)	21 September 2022

Previous employment 1

Employer name and address	G&D cafe 55 Little Clarendon St, Oxford OX1 2HS
Job title and main duties	Counter staff. Serving customers, stock replenishment, keeping shop floor and kitchen areas clean.
Full time/Part time	Part time
Date of Appointment	21 July 2023
End date (if applicable)	20 October 2023

Previous employment 2

Employer name and address	
Job title and main duties	
Full time/Part time	
Date of Appointment	
End date (if applicable)	

Previous employment 3

Employer name and address	
Job title and main duties	
Full time/Part time	
Date of Appointment	
End date (if applicable)	

Other Experience

Do you have any other relevant work experience to support your application?	
Please provide details	

Personal statement

Personal details

Do you have a personal statement to upload?	No
Please type your personal statement in the box	I have uploaded a statement encompassing this area in the research statement section.

Research proposal

Research proposal

Proposed supervisor 1	David Ellis
Proposed supervisor 1	
Proposed project title (max 150 chars)	Combinatorics

Passport and visa

Visa required

Do you require a visa to study in the UK?	No

Please fill out your passport details below. If you are unable to provide these at the current time you will have another opportunity to upload your passport after you submit the form. If you do not provide us with this information we will be unable to issue you with your confirmation of acceptance number and you will be unable to obtain a visa.

Passport details

Passport number	

Further details

Have you previously studied in the UK?	
What was the highest level of study in the UK?	
Please confirm the total length of your UK study in years	

Referees

Referee 1

Do you have a reference to upload?	No
Type of reference	Academic
Referee title	Professor
Forename	Dan
Surname	Ciubotaru
Position	Professor of Mathematics
Institution/Company	Oxford University
Email address	dan.ciubotaru@maths.ox.ac.uk
Country	United Kingdom

Referee 2

Do you have a second reference to upload?	No
Type of reference	Academic
Referee title	Dr
Forename	Robert
Surname	Hancock
Position	Postdoctoral Research Associate
Institution/Company	Oxford University
Email address	robert.hancock@maths.ox.ac.uk
Country	United Kingdom

Funding

Funding 1

What is your likely source of funding?	University of Bristol scholarship
Please give the name of your scholarship or Studentship	
Please specify	
Percentage from this source	100
Is this funding already secured?	No

Funding 2

What is your likely source of funding?	
Please give the name of your scholarship or Studentship	
Please specify	
Percentage from this source	
Is this funding already secured?	

Funding 3

What is your likely source of funding?	
Please give the name of your scholarship or Studentship	
Please specify	
Percentage from this source	
Is this funding already secured?	

Other funding

I would like to be considered for other funding opportunities	Yes

Submission

Documents

Document type	File name
Curriculum vitae	CV.pdf
Transcript	transcript.pdf
Research proposal	statement of purpose.pdf

By ticking the checkbox below and submitting your completed online application form, you acknowledge the University of Bristol will use the information provided from time to time, along with any further information about you the University may hold, for the purposes set out in the University's full Data Protection Statement. Applicants applying to the collaborative programmes of doctoral training should also read the Data Protection Statement for collaborative programmes of doctoral training.

The information that you provided on your application form will be used for the following purposes:

- To enable your application for entry to be considered and allow our Admissions Advisors, where applicable, to assist you through the application process;
- To enable the University to compile statistics, or to assist other organisations to do so. No statistical information will be published that would identify you personally;
- To enable the University to initiate your student record should you be offered a place at the University.

All applicants should note that the University reserves the right to make without notice changes in regulations, courses, fees etc at any time before or after a candidate's admission. Admission to the University is subject to the requirement that the candidate will comply with the University's registration procedure and will duly observe the Charter, Statutes, Ordinances and Regulations from time to time in force.

By ticking the checkbox below and submitting your completed online application form, you are confirming that the information given in this form is true, complete and accurate and that no information requested or other material information has been omitted. You are also confirming that you have read the Data Protection Statement and you confirm the statement below.

I can confirm that the information I have provided is true, complete and accurate. I accept that the information given in my application will be stored and processed by the University of Bristol, in accordance with the *UK General Data Protection Regulation and Data Protection Act 2018*, in order to:

- Consider my application and operate an effective and impartial admissions process;
- Monitor the University’s applicant and student profile;
- Comply with all laws and regulations;
- Ensure the wellbeing and security of all students and staff;
- If my application is successful to form the basis of the statement made within my application.

If the University of Bristol discovers that I have made a false statement or omitted signification information from my application, for example examination results, I understand that it may have to withdraw or amend its offer or terminate my registration, according to circumstances.

Education:

University of Oxford - MMath Mathematics (October 2020 - June 2025)

- Gibbs Prize in Part B with a cohort rank of 3.

King's College School Wimbledon (September 2009 - June 2020)

- A-levels 2020 4 subjects at grade A*
- GCSEs 2018 7 subjects at grade A*, 4 subjects at grade 9

Experience:

Research assistant, University of Oxford (July 2022 - September 2022)

- Ran and maintained code in a high performance computing cluster to map short read genetic data, and perform BGC (biased gene conversion) and GC-BGC analysis.
- Learnt R API wrappers to interface with taxonomy databases such as OTL (Open Tree of Life), NCBI, ITIS. Used this knowledge to mark investigated species in the research on a giant species tree.

Skills:

- Programming in Python, including NumPy and Matplotlib.
- Programming in MATLAB and R.
- Familiar with LaTeX.
- Comfortable working in a Linux command line, including tools such as Screen, Emacs and Git.
- Fluent speaker of Mandarin.

Hobbies, Interests and Achievements:

- Distinction in the second round of the 2020 British Maths Olympiad.
- Silver medal in the second round of the 2020 British Physics Olympiad.
- Creating mathematical visualisations in the Desmos graphing calculator.
- Overall winner of the Tom Rocks Maths essay competition.
- Writing python programs to further explore interesting topics.
- Roentgenium award in the 2019 Cambridge Chemistry Challenge, given to the top 56 candidates in the country.
- Programming in GLSL to create a raymarching.
- Taught maths once a week to a class of Year 5 and 6 children in sixth form, helping build communication and leadership skills.

I am pursuing a doctorate in combinatorics as I am fascinated by the vast and creative range of techniques used. Compressions give us a way to simplify systems while preserving necessary invariants, such as in the proof of Sauer-Shelah. Another example is the use of algebra, which allows us to encode problems into polynomials in order to apply arguments using linear algebra or the combinatorial Nullstellensatz.

Combinatorics is unique in mathematics due to the easy to understand statements of many of its problems. Norine's conjecture states that given an antipodal colouring of the n-dimensional hypercube, we can always find two antipodal vertices with a monochromatic path between them. This problem has been resilient to attack - an o(n) bound is not known, for example. It suggests that there are still things about the complex structure of the hypercube which we do not have the right tools to tackle - for example its low connectivity. If we further ask this path to be a geodesic, then it is equivalent to the conjecture that any colouring has two antipodal vertices connected by a geodesic changing colour at most once.

I am writing a dissertation with Robert Hancock on the Ramsey theory of random graphs. The introductory problem to this area asks what the threshold probabilities are for G(n,p) to have (or not have) the Ramsey property for some fixed graph F, as n tends to infinity. Although both results ultimately follow from a union bound, the 1 and 0 statements have very different flavours. The method of containers provides a much more straightforward proof to the 1-statement than before. Containers are an approximation to F-independent sets, and when combined with the appropriate supersaturation result (in this case a strengthening of Ramsey's theorem), it bounds the probability of not having the Ramsey property as o(1). The key idea in the 0-statement is to show that the F-components of G(n,p) are uniformly bounded w.h.p. A further avenue of investigation is a generalised random version of Rado's theorem. I am reading a paper due to Freschi, Hancock and Treglown where we look for monochromatic solutions to Ax = 0 in a sequence of subsets (Sn) of abelian groups. We sparsify Sn with probability p (depending on n), and ask what the threshold p is as n tends to infinity. The main machine in the paper outputs this threshold, upon input of a suitable sequence (Sn) and supersaturation result.

I specialised in extremal combinatorics in my fourth year, however I also have strong foundations in other areas of mathematics. In algebra I have taken a Galois theory course, where my favourite result is that the seemingly local condition of being a splitting field implies the global condition of normality. An introductory course in algebraic topology made me think about the similarity between Galois theory and covering spaces. This led me to read about category theory, which has been invaluable as a tool to think about different concepts in a unified way. For example, the fact that the tensor product from representation theory and the push out group used for Seifert-van Kampen are both initial objects. I have also taken courses in foundations, namely axiomatic set theory and model theory. I would enjoy opportunities where I can connect combinatorics to other areas of mathematics.

I did a research project with Robert Davies in statistical genetics in the summer of my second year. The project was working on the motif death pipeline, a program that identifies certain motifs (strings of DNA) that are lost more often than expected in genomes. My contributions included finding new sets of species with available short read genetic data to run through the pipeline. This involved determining their suitability based on theoretical metrics such as the amount of divergence between their genomes, and then working remotely on the BMRC cluster to start the pipeline. I also worked on refactoring of the configuration file format that specified the input data to the pipeline. By having these files in a standard format, we can generate a species tree with data pulled from the open tree of life in order to view which species have been investigated. This allows us to rapidly assess what areas might prove suitable for further investigation.

I took the initiative this year to reach out to coursemates and organise several informal study groups. For example, to engage in conversation about problem sheet questions, and for reading academic papers related to my dissertation. I look forward to the opportunity to collaborate with different people over the course of a PhD, and would be open to the prospect of spending time abroad. I have been thoroughly enjoying investigating the frontiers of research in my dissertation and hope to continue this during a PhD.

ACADEMIC TRANSCRIPT

Personal Information

Student:	Yichi Zhang
University Reference:	1328777
Qualification Sought:	Master of Mathematics
Start Date:	11 October 2020
HESA Reference:	2011565059105
FHEQ Level:	Masters
Expected end date:	30 June 2025

Programme Information

Teaching institution:	University of Oxford	Awarding Institution:	University of Oxford
College:	Somerville College	Mode of Attendance:	Full-time
Programme of Study:	Master of Mathematics in Mathematics	Language of Instruction:	English

Award Information

The student has yet to complete the programme of study shown above

Assessment Information (Academic Year, Assessment Name, Result Mark/Grade)

Qualifying examinations

2020/21	Computational Mathematics Practical Work	98
2020/21	Mathematics I	66
2020/21	Mathematics II	69
2020/21	Mathematics III	71
2020/21	Mathematics IV	72
2020/21	Mathematics V	83

Final Degree examinations

2021/22	A0 Linear Algebra	77
2021/22	A1 Differential Equations 1	84
2021/22	A2 Metric Spaces and Complex Analysis	91
2021/22	A3 Rings and Modules	85
2021/22	A4 Integration	97
2021/22	A5 Topology	100
2021/22	A8 Probability	72
2021/22	A9 Statistics	80
2021/22	ASO Short Options	68
2023/24	Applied Probability	79
2023/24	Functional Analysis I (old syllabus)	54
2023/24	Galois Theory	78
2023/24	Introduction to Representation Theory	82
2023/24	Logic	72
2023/24	Set Theory	100
2023/24	Statistical Machine Learning	82
2023/24	Topology and Groups	75
2024/25	Additive Combinatorics	

Registrar

Personal Information

Student:	Yichi Zhang
University Reference:	1328777
Qualification Sought:	Master of Mathematics
Start Date:	11 October 2020
HESA Reference:	2011565059105
FHEQ Level:	Masters
Expected end date:	30 June 2025

2024/25	Analytic Number Theory
2024/25	Analytic Topology
2024/25	Axiomatic Set Theory
2024/25	Combinatorics
2024/25	Dissertation on a Mathematical Topic (double unit)
2024/25	Godel's Incompleteness Theorems
2024/25	Model Theory
2024/25	Probabilistic Combinatorics

End of Transcript

Registrar

About the University of Oxford
The University of Oxford is an independent self-governing university. It is the oldest university in the English-speaking world and has been in continuous existence for some nine centuries. It is an international leader in learning, teaching and research. As a collegiate institution, it comprises the central university and 39 colleges and 6 permanent private halls

University of Oxford Transcripts
The transcript should not be released to another person, organisation or institution except to officials internal to your own organisation or institution who have a reasonable business use for the information. Release to other parties requires the written consent of the student. The following information is provided to aid in the evaluation of this student's academic record. Further explanation or detailed information can be obtained by contacting Degree Conferrals via the email address edocuments.support@admin.ox.ac.uk.
Under University regulations, Boards of Examiners may, where appropriate, take account of information additional to the profile of marks listed overleaf in deciding the final degree classification awarded to any student.
The explanatory text on the transcript is subject to change until such time that the programme of study is completed.

Academic Credit
The University does not routinely apply credit weightings to its programmes and its courses are not generally taught on a modular basis. We take each year of full-time undergraduate study to equal 120 UK credits and 180 UK credits for Masters-level postgraduate study according to the Higher Education Credit Framework for England. In relation to the European Credit Transfer Scheme (ECTS), this is equivalent to 60 credits for undergraduate study and 90 credits for Masters-level postgraduate study.

Framework for Higher Education Qualifications (FHEQ levels)

8 (Doctoral)	Doctoral Degrees (e.g. DPhil, DClinPsych)
7 (Masters)	Master's Degrees (including Integrated Master's Degrees)
	Postgraduate Diplomas & Certificates
6 (Honours)	Bachelor's Degrees with Honours
	Bachelor's Degrees
	Professional Graduate Certificate in Education
5 (Intermediate)	Undergraduate Diplomas
4 (Cert)	Undergraduate Certificates
	Certificate of Higher Education

Mark Scales
All marks included on a final academic transcript have been ratified by the Registrar. Examiners are required to express final agreed marks on all formally assessed work according to the following marking scales:

Foundation Year Programmes (Cert HE)

70-100	Distinction
60-69	Merit
40-59	Pass
0-39	Fail

Undergraduate Programmes

	Model 1	**Model 2**
70-100	First Class	Distinction
60-69	Upper Second Class	Pass
50-59	Lower Second Class	Pass
40-49	Third Class	Pass
30-39	Pass	Fail
0-29	Fail	Fail

Model 1 will be used for all final assessments. Model 2 will be used for all qualifying assessments unless the explanatory text overleaf states otherwise.

Postgraduate Taught Programmes
For students who started their courses **before** October 2018.

Model 1	**Model 2**	
70-100	70-100	Distinction
50-69	60-69	Pass
0-49	0-59	Fail

For students who started their courses **from** October 2018.

Model 1	**Model 2**	
70-100	70-100	Distinction
N/A	65-69	Merit
50-69	50-64	Pass
0-49	0-49	Fail

Model 2 will be used for all Award Programmes unless the explanatory text overleaf states otherwise.

Transcript Terminology
Results Not Moderated (On-Course Transcripts Only): Indicates a mark that may be subject to moderation in the process of concluding the final outcome of an examination comprising more than one part and taken over more than one year.
Declared to have deserved: the exam board considered the candidate was absent from part of the examination for good cause and declared them to deserve the Award.

Programme Information
The relevant *Examination Regulations* for the programme are available at: https://examregs.admin.ox.ac.uk/

Authentication
This academic transcript can be authenticated by scanning the QR code which is visible in the main section of the document. Further information on authentication may be obtained by contacting Degree Conferrals on the email address edocuments.support@admin.ox.ac.uk

Mathematical Institute
Andrew Wiles Building, Radcliffe Observatory Quarter
Woodstock Road, Oxford, OX2 6GG

20th December 2024

Dear Admissions Team,

I am writing to recommend Richard Zhang to you to do a PhD in Mathematics at the University of Bristol.

I am currently supervising Richard on his final year (Master's) dissertation at the University of Oxford. I first met Richard about three months ago, a few weeks before students were due to submit their choices for their dissertations. We met to discuss my project, as he wanted to find out more about it before making his choice. He subsequently chose my project, and is one of four students undertaking my project for their dissertation. (In fact, he was initially assigned another project, but asked me if I would consider taking an extra student as my project was his favoured topic - I agreed.)

From our initial meeting, Richard immediately struck me as a highly inquisitive and engaged student. Since the start of the project, I have met the four students for two group meetings, and for one individual meeting each. Richard has continued to be very engaged, answering questions I asked in the group meetings and asking thoughtful and interesting questions.

Specifically, the project is on Random Ramsey problems. I initially set the students the task of reading and understanding 'A short proof of the Random Ramsey theorem' by Nenadov and Steger. Richard seems to have taken this task in his stride, and has asked many questions which demonstrate his understanding and interest in the problem, such as asking how the first moment method is used more generally, and how to prove a container result such as the one used as a black box within this paper. He has also not been afraid to ask me to explain parts of the paper which he had not understood, for example on inequalities within calculations, or unexplained assumptions made within the paper. His perseverance to gain a detailed understanding seems very high. Just before the Christmas break, I challenged the students to go on to find and choose a related problem to study. I am excited to see what direction he will take his project in.

Richard's CV looks very impressive, he achieved third best in maths for the whole year for his second year exams, undertook a summer project in coding, and looks easily on track to receive a first in his MMath degree. There is a gap in his modules in having not taken Oxford's third year course on Graph Theory, however, he took Combinatorics this term, and I understand he plans to take Probabilistic Combinatorics next term, and also he seems a very fast learner so I have no doubt he would quickly be able to catch up with filling in any gaps in his knowledge.

To conclude, I think Richard is an exceptional and highly enthusiastic student and I strongly recommend him to you to study for a PhD.

Yours sincerely,

Robert Hancock

(Postdoctoral Research Associate, in Mathematics at the University of Oxford)

General Enquiries Tel: +44 (0)1865 273525 Direct: +44 (0)1865 615101
Fax: +44 (0)1865 273583 Email: robert.hancock@maths.ox.ac.uk Web: https://www.maths.ox.ac.uk/people/robert.hancock

Mathematical Institute
Andrew Wiles Building, Radcliffe Observatory Quarter
Woodstock Road, Oxford, OX2 6GG

2nd January 2025

Letter in support of Richard Zhang's DPhil application

I am writing in support of Richard Zhang's application for a funded DPhil place in Mathematics. Richard is currently a student in Part C at Oxford (4th year in the integrated Maths master programme), having finished three years of undergraduate degree at Oxford this summer. He is a student at Somerville College, where I was his tutor for pure maths and his personal tutor, so I know him very well.

Richard's academic results are outstanding. He obtained a first class classification at the end of his third year (and a distinction in each of the previous two years). He ranked 5th in the second year and 11th in the third year in a cohort of about 170 students. He is a very smart student, passionate and hard working. He thinks deeply about mathematics and he is constantly learning and pushing himself. I have been continuously impressed when teaching him from first year analysis to complex analysis and Part A linear algebra, integration, or rings and modules. Richard was the best student in his Somerville cohort in my tutorials. He is particularly interested in algebra, combinatorics, and topology, and in these topics his exam results have been outstanding, for example 100 in second-year Topology, 85 in Rings and Modules, 82 in Representation Theory, but also 91 in Complex Analysis or 94 in Integration (introduction to measure theory), 100 in Set Theory, so he has a very solid and well-rounded mathematical foundation.

His intended area of research is Combinatorics which is an excellent fit for his interests and his superb breadth in Mathematics. He is currently working on his fourth-year dissertation on a topic in Ramsey theory of random graphs. He is enthusiastic about the topic and has fully immersed himself in the subject. While this is not my area of research, knowing Richard and having talked to him about how the project is developing, I very much expect that his thesis will contain original results that would go well beyond what's expected from these theses.

I believe Richard will become a first rate research researcher and I am excited to see where his journey will take him. He is passionate about mathematical research, very smart, and motivated and a clear thinker. He is modest and considerate, and he worked very well with his colleagues in college. I'm sure

General Enquiries Tel: +44 (0)1865 273525 Direct: +44 (0)1865 70715
Fax: +44 (0)1865 270515 Email: dan.ciubotaru@maths.ox.ac.uk Web: http://www.maths.ox.ac.uk/people/profiles/dan.ciubotaru

he will be an excellent TA as well. I recommend him to you enthusiastically.

Yours sincerely,

Dan Ciubotaru
Professor of Mathematics
Diana Brown Fellow, Somerville College
University of Oxford