

Academic Promotion Application Form – Non Professorial

This should be completed by the member of staff who is applying for promotion with comments from the Head of Department, and **submitted with an up-to-date CV** in the approved style (available on the Academic Processes webpage) to the Academic Processes Team in Human Resources.

Prior to completion of this document, please read the document providing details on criteria and evidence and the standards matrix.

Name of Employee	Nicholas James Jackson	Department	Mathematics and Economics
Current Appointment	Teaching Fellow (FA6)	Level of Promotion applying for?	Senior Teaching Fellow (FA7)
FTE	1.00 (0.22 Maths, 0.78 Economics)	Career track (R&T- T-focussed, R-focussed)	T-focused
Previous appointments held at University of Warwick (please indicate if any of these appointments were part time)	Part-Time Teacher, Department of Mathematics, 2004–2016 Part-Time Teacher, Department of Economics, 2006–2017		
Please detail any significant periods of leave (e.g. parental, sickness)			

Please summarise achievements in the following areas of activity:

Research and Scholarship
Minimum threshold requirement for the level of promotion for which you are applying: 2
Score which you believe your experience demonstrates: 4
<p>I have undertaken and disseminated original research in mathematics, both on my own and in collaboration with colleagues at Warwick and elsewhere. I successfully completed an MSc in Mathematics, specialising in algebraic and geometric topology, during which I wrote a dissertation on knot classification and wrote software to calculate several knot invariants for two-bridge knots.</p> <p>I successfully completed a PhD in Mathematics, focusing on the homological algebra of a class of algebraic structures called racks and quandles, which are relevant in knot theory. I spoke on my research at the British Mathematical Colloquium, and published a journal article and preprint on my work.</p> <p>Later, Stefan Friedl, Nathan Dunfield and I studied twisted Alexander polynomials of hyperbolic knots – those whose complement admits a canonical hyperbolic geometric structure. We conjectured that these polynomials detected genus and fibring, and verified this conjecture for all knots with up to fifteen crossings. The conjecture has since been proved for certain classes of hyperbolic knots but remains open in general.</p> <p>With Colin Johnson and Matt Rathbun, I have studied applications of genetic algorithms to knot theory. We published a conference paper on unknotting strategies for closed braids, and are currently trying to generalise this work to find sharper bounds on unknotting numbers.</p> <p>I have supervised ten final-year MMath research projects on subjects including category theory, Khovanov homology, differential topology and knot theory. I am currently supervising three Economics MSc dissertation students.</p>

During 2014-2015 I successfully undertook a Postgraduate Award in Technology Enhanced Learning, and completed a project studying the use of GeoGebra, an interactive algebra and geometry toolkit, in undergraduate mathematics teaching. Feedback indicated that the students found this enhanced their understanding of key mathematical concepts. I gave a talk on this project as part of the Economics department Teaching and Learning Seminar.

I am currently in the latter stages of writing an approximately 500-page undergraduate textbook on abstract algebra, using an example-driven approach. This is to be published by Oxford University Press, and is now complete except for the index and some end-of-chapter exercises.

I believe that I have demonstrated an ability to **undertake and disseminate or publish original, high quality research** that makes a significant contribution to mathematics and pedagogy.

Teaching and Learning

Minimum threshold requirement for the level of promotion for which you are applying: 5

Score which you believe your experience demonstrates: 5

I have fifteen years' experience of university-level teaching.

Since 2007 I have been module leader for MA397 Consolidation, an intensive revision module for struggling third-year students, comprising weekly assignments, one-to-one tutorials and class tests. This is consistently very successful, evidenced by a marked increase in the students' engagement and academic results: most years all of them subsequently graduate with honours.

I run twice-weekly maths drop-in sessions in the Economics Department, providing general help for undergraduate and postgraduate students, some of whom lack confidence in maths.

Since 2006 I have been module leader for the 15 CATS modules EC119 Mathematical Analysis and EC133 Linear Algebra - as well as the predecessor 30 CATS module EC119 Mathematics for Economists. I teach the lectures, set and mark the summer exam, and liaise with the class tutor, as well as keeping under review the module content. In a typical year, about 50–80 students take each module, and feedback is consistently positive, with student evaluation scores around 4.5/5.0. This year I was nominated for a Warwick Award for Teaching Excellence.

Since 2017 I have been a lecturer and class tutor for the pre-sessional MSc module EC961 Introductory Mathematics and Statistics, with particular responsibility for designing and teaching the linear algebra section of the module. In 2018 I wrote and recorded four introductory video lectures to provide incoming students with necessary background knowledge on some of the mathematical topics.

In the last year I have also written and taught short non-credit courses on computer programming and real analysis for Economics MSc, MRes and PhD students, and helped develop introductory online resources in R programming for Economics students.

I have been a personal tutor in the Department of Mathematics since 2004 and in the Department of Economics since 2017. In that time I have supported well over a hundred mathematics and economics students through their degrees, and have received very positive feedback from both my students and from senior colleagues.

I have been a Fellow of the Higher Education Academy since 2016, and am in the process of volunteering to mentor colleagues applying for fellowship.

I regularly attend and contribute to the Economics department Teaching and Learning Seminar, and meetings of the LDC Education and Extended Classroom forums. I have just been appointed a Fellow of the Warwick International Higher Education Academy, and have so far contributed to discussions in the Teaching Reward and Recognition Learning Circle.

I have contributed to curriculum revision and development. In 2018, together with two colleagues, I submitted a proposal to the Mathematics department teaching committee for revising and expanding the module MA213 Second Year Essay. Our recommendations were favourably received and we plan to implement some of them in the next academic year. I am also a member of the Economics department's CORE working group, overseeing the revision and modernisation of the first year undergraduate syllabus. I have been particularly involved with discussions on the mathematics content of the course.

I believe that I have demonstrated an ability to **design, deliver, evaluate and assess teaching to a high standard**, engage effectively with students and collaborate with colleagues to inform the enhancement of my own and others' teaching practices.

Impact, Outreach and Engagement

Minimum threshold requirement for the level of promotion for which you are applying: 2

Score which you believe your experience demonstrates: 4

I have given numerous school outreach and recruitment talks, and I participate in the University's Widening Participation Network. I have twice spoken at the Pint of Science Festival, and organised children's maths activities at the 2019 British Science Festival. I am the local liaison and publicity officer for the British Science Association mathematics section committee, working with representatives of several mathematics and statistics learned societies.

I have spoken to the Warwick Mathematics Society, and in 2018 spoke at the Mathematics department's Ada Lovelace Day afternoon, part of a national initiative to highlight contributions of women in mathematics and science.

I regularly speak and participate in panel discussions at literary science fiction conventions, explaining mathematics and science to lay audiences with diverse backgrounds. Every year I speak at Eastercon, the longest-running annual British convention, a non-profit, volunteer-run literature, media and science festival with typically 800–1200 members. This year I also served on the programming committee.

I also spoke at the 2014 and 2019 World SF Conventions, international events with several thousand attending members. I was a member of the science programme committee in 2014 and coordinated an academic poster session enabling active researchers to disseminate their work to an engaged international audience.

I am involved in several other local and national public engagement and outreach activities: I am a STEM Ambassador, I help run local Code Club and Coder Dojo classes, teaching computer programming to children, and I am an active member of the BrumSciComm science communication group.

I believe I have developed **regional and national recognition for work demonstrating the value of broad based academic activity** in mathematics and science. I have participated in key projects and events, and

engaged with national and international external networks and stakeholders to demonstrate the value of academic work in mathematics and science.

Collegiality, Leadership, Management

Minimum threshold requirement for the level of promotion for which you are applying: 2
Score which you believe your experience demonstrates: 3

I regularly contribute to a range of administrative activities within my departments.

I am a module leader for the Economics department first year Personal Development Module, a core non-credit module comprising a range of activities designed to help students engage with their studies and learn a number of important transferable skills. In particular, I helped coordinate and mark the economics briefing group projects, and was involved in discussions concerning the content of the module. I delivered the induction session for the Economics department undergraduate mentor scheme and spoke at the awards ceremony for successful participants.

I am the Economics department representative on the Faculty of Social Sciences Undergraduate Appeals Board.

I often help at open days in both the Mathematics and Economics departments, by giving talks and participating in question and answer sessions for prospective applicants.

I have served as a senior exam invigilator on numerous occasions.

From 2004–2014 I was a production editor, programmer and system administrator for Mathematical Sciences Publishers, a non-profit academic publishing company run from the Mathematics departments at Warwick and the University of California at Berkeley. I edited and oversaw publication of two respected journals: *Algebraic & Geometric Topology*, and *Geometry & Topology*. I designed and wrote software to facilitate electronic publication of articles, and was responsible for running and maintaining the Warwick-based servers.

I believe I have demonstrated the ability to **actively organise and manage activity in support of academic processes, showing emerging leadership ability** within my departments.

Minimum score required	14	Total Score <i>Please add your scores from each of the four areas</i>	16
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Recommendation from Head of Department (this should include comments on each of the four areas of activity outlined above and a statement about whether or not the claimed score is agreed.)

Please indicate below the scores that you think the applicant meets.

Research and Scholarship	4	Teaching and Learning	5
Impact, Outreach and Engagement	3	Collegiality, Leadership, Management	3

Please provide comments on each of the areas of activity:

Note as Nick is appointed within both Maths and Economics this is a joint contribution from both Departments, although it has been signed by the HoD in Economics.

Research and Scholarship

Nick has an appointed by both within the Departments of Mathematics and Economics as a Teaching Fellow, although his contract within Economics is higher. We encourage all of our Teaching Fellows to be research active as we want teaching at all levels to be research-led. Nicholas has a PhD in Mathematics (from Warwick), resulting in a (peer-reviewed) publication. He has published two other papers more recently, and is engaged in ongoing research collaboration.

Research publication does not form a formal part of Nicholas' workload, so it is particularly impressive that he is actively maintaining contact with research mathematics. His research including, the writing of a textbook, informs his teaching within both the Departments. He supervises students at all levels within Mathematics, but until this year did not feel comfortable undertaking supervision within Economics, although this year he did take 3 MSc students to supervise.

Teaching and Learning (please review the applicants teaching profile, and have this available should the Committee wish to see it)

Nicholas teaches small groups in different formats within mathematics. He has convened the final-year module MA397 Consolidation for over a decade. This module is available only to Year 3 students who for some reason have a significant gap in their background mathematical knowledge. For example, this may be the case when a student returns from temporary withdrawal, or could be evidenced by performance on core modules in year 2. Thus the students on this module need particular attention. Nicholas gives individual consideration to students on this module to design support just where they need it. We judge that this is a strong contributing factor to the cases we see of students recovering from difficult circumstance in the middle of their degree to success at the end of it.

Within Economics Nick has been teaching for some 13 years now and his contribution to the development of mathematical skills of our undergraduates cannot be underestimated. He takes two optional year 1 modules in further advanced mathematical skills for economists. The number on these modules has varied between around 40-90 students in each year. Nick usually has one Teaching Assistant attached to the module to deliver the classes and the teaching team directed by Nick delivers a very high level of teaching to the students on these modules. As somebody who teaches statistics to year 1 students, I understand the challenges of teaching mathematics to students, who do not always see the relevance of virtue of the mathematics component and despite the evaluations for this module are very strong. Nick also teaches mathematics in the pre-sessional Maths and statistics module to around 220-250 MSc students. This module is taking students from around the world and giving them the mathematical skills they will need for the MSc, teaching on this module is very challenging given the heterogeneity of the student in-take. He has organised a series of introductory maths videos to help students with a weaker background of maths training. Despite these challenges Nick continues to deliver an outstanding series of lectures which prepare the students for the MSc.

Nick also has developed a series of maths support classes within Economics to support students from all levels (Undergraduate, MSc, MRes) with their maths training. Over the last two years he also has delivered a non-credit bearing maths lecture series to MS students to help support them in their training for MRes/PhD applications and a module introducing student to computer language training in R. Part of this work has also helped in the Department providing students with resources to learn R within Moodle.

Impact, Outreach and Engagement

Nicholas is an enthusiastic and engaging public speaker of science (including the British Science Festival (2019) and his work with the British Science Association mathematics section, along with a number of other organisations in trying to spread his love of mathematics).

He contributes to events in the Maths Department when asked, and also to many more outside. The Maths Department has a history of public engagement with mathematics, and Nicholas is clearly making a contribution in a challenging area that has lots of promise, and with positive results to date. He works with children to help with the learning of computer programming and is keen to develop further links with young people through schools and other organisations with which he is linked.

Collegiality, Leadership, Management


Nick is an excellent colleague and is always keen to engage with students. The valuable work he does with academically struggling students requires adaptability and flexibility when it comes to agreeing what kind of work needs doing and how much. Nicholas is positive in such discussions within the maths department, and has always helped where he can over many years over a range of academic and support activities.

Nick is always present at all student-focused events, whether that is Open Days, or student socials. As a Teaching Fellow with a great deal of experience, he is very keen to talk to the other teaching fellows in the Economics Department and help integrate them into the work environment, this is important given the number of TFs we have in the Economics Department (21) and the relatively high turn-over of personnel within this group.


In terms of management Nick's main roles is a lead in the personal Development Module (PDM), which is compulsory for all 1st year students and is aimed at developing and broadening the students' skill-set to enhance their employability. The module involves some activities (economic briefing sessions, how to write an essay), along with some talks (360 lectures by external speakers and also talks by Careers) and some support around developing other skills

(see <https://warwick.ac.uk/fac/soc/economics/current/ug/induction/development/>)

This is an integral part of the Department's employment strategy and the module needs continual development to ensure it remains relevant.

Signed		Date	24/09/2019
Print Name	Jeremy Smith		

To be signed by the member of staff applying for promotion

Signed		Date	26/09/2019
Print Name	Nicholas Jackson		

Please tick the box to confirm that you agree to your name being published if your application is successful:

PERSONAL DETAILS

Full Name and Title: Dr Nicholas James Jackson

Department: Mathematics and Economics

Title of current appointment: Teaching Fellow

Education/Qualifications:

Nottingham High School 1989	GCSE: Mathematics (A), Physics (A), Chemistry (A), French (A), Latin (B), English Language (B), Music (C), English Literature (C)
Nottingham High School 1991	GCE A-Level: Mathematics (A), Further Mathematics (A), Physics (B) STEP: Further Mathematics A (2), Further Mathematics B (3)
University of York 1994	BA in Mathematics (class 2.2 honours)
University of Warwick 1998	MSc in Mathematics Dissertation: <i>Knot Classification and Enumeration</i>
University of Warwick 2004	PhD in Mathematics Thesis: <i>Homological Algebra of Racks and Quandles</i>
University of Warwick 2015	Postgraduate Award in Technology Enhanced Learning Project: <i>Using GeoGebra in Undergraduate Mathematics Teaching</i>

Appointments held:

Jul 1994 – Dec 1995	Programmer, Network Control Group, Department of Mathematics, University of York
Jan 1996 – Sep 1996	Developer, Infocom UK Ltd
Oct 1997 – Jul 1999	Developer, Infocom UK Ltd
Aug 1999 – Nov 2002	Consultant, Parasol Solutions Ltd
Aug 2003 – Nov 2004	Developer, Eccleston and Hart Ltd and NS Optimum Ltd
Nov 2004 – Oct 2014	Production Editor, Mathematical Sciences Publishers
Nov 2004 – Sep 2017	Part-Time Teacher, University of Warwick
Oct 2016 –	Teaching Fellow, Department of Mathematics, University of Warwick
Oct 2017 –	Teaching Fellow, Department of Economics, University of Warwick

Membership of learned or professional societies:

1999 – Member, London Mathematical Society

2016 – Fellow, Higher Education Academy

RESEARCH AND SCHOLARSHIP

Publications:

1. N J Jackson, *Extensions of racks and quandles*, Homology, Homotopy and Applications 7:1 (2005) 151–167, arXiv:math.CT/0408040 (peer-reviewed journal article)
2. N J Jackson, *Rack and quandle homology*, arXiv:math.CT/0411055 (preprint)
3. S K Friedl and N J Jackson, *Approximations to the volume of hyperbolic knots*, in: *Twisted topological invariants and topology of low-dimensional manifolds* (ed. T Morifuji), RIMS Kôkyûroku 1747, Kyoto (2011) 35–46, arXiv:1102.3742 (peer-reviewed conference paper, 50% contribution)
4. N M Dunfield, S K Friedl, and N J Jackson, *Twisted Alexander polynomials of hyperbolic knots*, Experimental Mathematics 21.4 (2012) 329–352, arXiv:1108.3045 (peer-reviewed journal article, 33% contribution)
5. N J Jackson and C G Johnson, *Evolving unknotting strategies for knots and braids*, in: *Proceedings of the 1st Symposium on Nature Inspired Computing, Birmingham* (2012), arXiv: 1302.0787 (peer-reviewed conference paper, 50% contribution)
6. N J Jackson, *A Course in Abstract Algebra*, to be published by Oxford University Press (~500pp, undergraduate textbook, complete except for exercises and index, expected to be published 2020)

TEACHING AND LEARNING

Departmental Duties:

	<u>Length of Course</u> <u>(Contact hours)</u>	<u>Number of</u> <u>Students</u> <u>(approx)</u> <u>ug</u> <u>pg</u>
<i>Lecture Courses</i>		
EC961 Introductory Maths and Statistics	7 (of 28)	280 (pg)
EC119 Mathematical Analysis		
EC133 Linear Algebra	25	82 (ug)
MA397 Consolidation	25	55 (ug)
Personal Development Module / Economic Briefing Projects	20	5 (ug)
	(variable)	394 (ug)
<i>Tutorials/Seminars</i>		
Personal tutor, Economics	(variable)	18 (ug)
Personal tutor, Maths	(variable)	31 (ug)
MSc supervisor, Economics	(variable)	3 (pg)
MA225 Differentiation		

Maths drop-in sessions, Economics	30 40	1 (ug) (variable)
<i>Taught Masters Classes</i> Real Analysis	6	30 (pg)
EC961 Introductory Maths and Statistics	25	15 (pg)
<i>TOTAL</i>	178	328 (pg) 586 (ug)

Other activities

1. Fellow of the Warwick International Higher Education Academy, 2019–2022
2. Nomination for Warwick Award for Teaching Excellence, 2019

IMPACT, OUTREACH AND ENGAGEMENT

Talks and panel discussions on science and mathematics to educated lay/nonspecialist audiences at literary science fiction conventions, particularly Eastercon (which began in 1948 and is the longest running annual British SF convention) and the World SF Convention (which began in 1939 and is the longest running international SF convention):

1. *The Mathematics of Knots*, talk, Eastercon 2008
2. *The Poincaré Conjecture*, talk, Eastercon 2009
3. *The Geometry Of The Place Was All Wrong*, talk, Eastercon 2010
4. *The Bits Between the Bits*, talk, Eastercon 2011
5. *Unsolvable Problems in Mathematics*, talk, Eastercon 2012
6. *Pure and Applied Mathematics*, talk, Eastercon 2013
7. *The Millennium Prize Problems*, panel, Eastercon 2013
8. *Networks and Small Worlds*, talk, Eastercon 2014
9. Interview with Prof Ian Stewart, World SF Convention 2014
10. *What's New in Mathematics*, panel, World SF Convention 2014
11. *Knots in Non-Euclidean Space*, talk, World SF Convention 2014
12. Academic poster session coordinator, World SF Convention 2014
13. Science programme committee, World SF Convention 2014
14. *Quintic Equations*, talk, Eastercon 2015
15. *Mathematics and Language*, talk, Eastercon 2017
16. *Women of Mathematics*, talk, Eastercon 2018
17. Programme committee, Eastercon 2019
18. *Untangling DNA*, talk, Eastercon 2019
19. *Maths Creativity*, children's workshop, Eastercon 2019
20. *Mechanical Computing*, panel, Eastercon 2019
21. *Maths and Music*, panel, World SF Convention 2019
22. *Hyperbolic crochet*, panel, World SF Convention 2019

Talks at other public events, including the Pint of Science festival, Skeptics in the Pub, and the MathsJam Gathering and Talking Maths in Public conferences:

1. *Outsider Mathematics*, talk, Coventry Skeptics in the Pub, Oct 2012
2. *Poincaré Dodecahedral Space*, talk, MathsJam Gathering 2012
3. *Hyperbolic Knots*, talk, MathsJam Gathering 2013
4. *Sofia Kovalevskaya: Nihilist Girl*, talk, MathsJam Gathering 2014
5. *Émilie du Châtelet*, talk, MathsJam Gathering 2015

6. *Fractran*, talk, MathsJam Gathering 2016
7. *Talking Maths in Public at SF Conventions*, talk, Talking Maths in Public 2017
8. *Public Engagement at SF Conventions*, talk, Warwick Public Engagement Network 2017
9. *The Shape of Data*, talk, Pint of Science 2018
10. *Untangling DNA*, talk, Pint of Science 2019
11. Interactive Maths Workshop, British Science Festival 2019

Talks to student groups at Warwick:

1. *Categorification and TQFTs*, talk, Warwick Maths Society 2013
2. *Émilie du Châtelet*, talk, Ada Lovelace Day 2018
3. *Introduction to Category Theory*, talk, Warwick Maths Society 2019

University outreach activities:

1. *Mathematics and Art*, talk, Warwick Aspiration Day 2017
2. *Error Correcting Codes*, talk, Science and Survival 2017
3. *The Mathematics of Networks*, talk, Experience Warwick 2017
4. *The Mathematics of Networks*, talk, WMG Academy 2018
5. *The Shape of Data*, talk, Maths Department Open Day 2018
6. *Studying Maths and Economics at Warwick*, talk, Merchant Taylor's School 2019
7. Various Q&A sessions at University open days
8. Local liaison to the British Science Association mathematics section for the 2019 British Science Festival

Other external outreach activities:

1. Member of the BrumSciComm science communication group since 2015
2. STEM Ambassador since 2016
3. Volunteer and co-organiser, Earlsdon Library Code Club 2016–2017
4. Quoted in *New Scientist* and *Popular Science*, discussing the Riemann Hypothesis, Sep 2018
5. Volunteer, Coder Dojo, Coventry Library, since 2018

COLLEGIALITY, LEADERSHIP. MANAGEMENT

1. Economics department representative, Faculty of Social Sciences Undergraduate Appeals Board since 2018
2. Module leader, Economics department first year Personal Development Module, since 2018
3. Member of the Economics department CORE working group, helping revise the maths content of the first year syllabus, since 2017
4. Regularly serve as senior exam invigilator
5. Regular attendance and contributions to the LDC Education and Extended Classroom forums
6. Wrote and recorded four introductory maths videos for incoming Economics MSc students, Summer 2018
7. Delivered training presentation for the Economics department Undergraduate Mentor scheme, 2018
8. Production editor, programmer and system administrator, Mathematical Sciences Publishers 2004–2014, with particular responsibility for the journals *Algebraic & Geometric Topology*, and *Geometry & Topology*

Date Curriculum Vitae Prepared: 10 September 2019