

SENIOR RESEARCH ASSOCIATE

School of Mathematics

RA2198

CANDIDATE BROCHURE



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WHAT MAKES UEA SO SPECIAL?

The University of East Anglia is a publicly funded major UK research and teaching university. It was built to embody a radical new vision for higher education, where interdisciplinarity is crucial and excellence in both research and teaching is valued. UEA consistently ranks within the top quarter of universities in the UK for the quality of research and teaching.

As a major regional employer and cultural centre, we take our regional civic responsibilities very seriously and have kept our sights on the people and place we call home. In fact, we launched our University Civic Charter in October 2023; created from in-depth community engagement, renewing our commitment to the region as part of our 60th anniversary.

There are many things which make UEA special, not least of which is the community of staff and students that work and study here. UEA includes four Nobel prize winners, including Sir Paul Nurse and Sir Michael Houghton, and many fellows of the Royal Society and British Academy amongst our alumni and current staff.

Our campus is home to Sir Denys Lasdun's iconic brutalist architecture set in hundreds of acres of beautiful country park that includes a large broad (lake). In the spirit of Lasdun's ambition to inspire an anatomy of ideas, today, UEA is tackling some of the key challenges of the changing world. UEA's research combines disciplines

and breaks new boundaries across its priority research themes of climate, creative and health.

UEA is the place where global warming was first documented. Since the 1970s, UEA's Climatic Research Unit, and more recently Tyndall Centre for Climate Change (Headquarters hosted at UEA), have played a pivotal role in developing temperature records and climate models, contributing to the understanding of climate change, and informing global policy. Our Professors Corinne Le Quere and Rachel Warren were recipients of Nobel Peace Prize (2007), awarded to Al Gore and the Intergovernmental Panel for Climate Change (IPCC) in recognition of efforts to increase public knowledge of anthropogenic climate change. Environmental Science and Global Studies at UEA continue to be a major powerhouse for research and teaching.

UEA is widely regarded as a pioneer in creative writing, having established the UK's first Creative Writing Masters programme in 1970. This renowned programme has since attracted and produced numerous successful writers, including Booker Prize winners such as lan McEwan and Anne Enright, and Nobel Prize Winner Kazuo Ishiguro. In recent years, UEA academics have played a pivotal role in the discovery and presentation of the Gloucester Royal shipwreck (Norfolk's Mary Rose). Our iconic Sainsbury Centre for Visual Arts is a major museum and arts research facility.



Health research at UEA not only embraces the Faculty of Medicine and Health but draws in research from both social and natural sciences. Research under this theme has made major contributions in the fields of healthy ageing, epidemiology and involving citizens (via our innovative Citizens' Academy) in improving health care outcomes. This theme benefits from close association with the other major research institutes on the Norwich Research Park; notably the Norfolk and Norwich University Hospital and the Quadram Institute. The Norwich Cancer Research Network, and Norfolk Institute for Healthy Ageing, are examples of key mechanisms for delivery of real impact from health research at UEA.

UEA has been a major success over the last 60 years and looks forward with confidence to the next 60 years.

For an informal discussion about the post please contact Dr Robert D. Gray, Reader in Pure Mathematics, via Robert.D.Gray@uea.ac.uk.

UEA is part of the Norwich Research Park

Norwich Research Park (NRP) membership locates UEA in one of the largest concentrations of research institutes in the whole of Europe – four independent internationally-renowned research institutes: John Innes Centre, Quadram Institute, Earlham Institute and The Sainsbury Laboratory; with the University of East Anglia and Norfolk and Norwich University Hospitals NHS Foundation Trust, supported and funded by The John Innes Foundation, The Gatsby Foundation, and UKRI Biotechnology and Biological Sciences Research Council.

The NRP provides an ideal environment for collaborative use of infrastructure and facilities, with a single portal for academics and businesses to access the specialist facilities across the Park.

The Enterprise Centre is a regional business, knowledge and innovation hub, with workspace provision and supports over 80 businesses working alongside UEA staff and students in a dynamic and vibrant entrepreneurial community. On the wider NRP, there are dedicated laboratory and office spaces in the Innovation Centre and Centrum hosting over 600 staff within a total of 115 businesses and spinouts.



OUR BENEFITS

UEA offers a fantastic benefits package for staff. We recognise all our staff have different priorities and lifestyles so we are continually reviewing our offering to ensure there are benefits which suit everyone. Current benefits include:



Further information can be found on our **Staff Benefits page**.

THE ROLE

The Senior Research Associate will work with the PI Robert D. Gray on the EPSRC project EP/V032003/1 "Algorithmic, topological and geometric aspects of infinite groups, monoids and inverse semigroups". They will contribute to one or more (depending on their research expertise) of the following main research streams of the project:

- I) Word and membership problems
- II) Topology, homology and geometry
- III) Diophantine problem, equations, and first-order theory.

As well as working with Dr Gray and other researchers at UEA, the Senior Research Associate will have the opportunity to visit and collaborate with the named Project Partners on this project Professor Igor Dolinka of the University of Novi Sad, Serbia, and/or Professor Benjamin Steinberg of the City College of New York, USA, as well as other national and international collaborators involved in the project.

KEY RESPONSIBILITIES

- To work with the PI Robert D. Gray on the EPSRC project EP/ V032003/1 "Algorithmic, topological and geometric aspects of infinite groups, monoids and inverse semigroups".
- To conduct high-quality research, publish results in refereed journals, and present results in seminars and at national and international conferences.
- To contribute to the research environment of the School of Mathematics at UEA by attending local seminars or reading groups, and helping with the organisation of research workshops or other events.
- To be actively developing your own research network with researchers in other institutions, nationally and internationally.
- To assess research findings for the need/scope for further investigations.
- To communicate with users of, and communities relevant to, the research and, as appropriate, the subjects of your research.

THE PERSON

EDUCATION, EXPERIENCE AND ACHIEVEMENTS

- PhD in Mathematics (or achieve within 6 months of appointment) (E)
- Track record of excellent research in one or more of the following areas: geometric group theory, one-relator groups, combinatorial semigroup theory, inverse semigroup theory, algorithmic and decision problems in algebra, topological and homological methods for groups and/or monoids, logic and model theory of groups and/or monoids (E)
- Previous experience of presenting mathematics research at seminars, conferences, and/or workshops (E)
- Track record in research and publishing commensurate with career stage (E).
- Previous experience of independent research (E)

SKILLS AND KNOWLEDGE

- Excellent oral, written and interpersonal and communication skills with ability to deal face-to-face, via telephone and email with individuals from a variety of backgrounds, cultures and nationalities (E)
- Good time management and organisational skills (E)
- Good interpersonal skills. Initiative in planning research (E)
- High-level analytical skills (E)
- Publications in leading mathematics journals (D)
- Advanced knowledge directly related to their research project, e.g. previous research in the area of virtually special groups (D)
- Ability to contribute ideas for new research projects (D)

PERSONAL ATTRIBUTES

- Ability to work independently, and the ability to work in collaboration with others (E)
- Ability to communicate complex information clearly, both orally and in writing (E)
- Ability to use initiative, and apply creativity, to solve problems that are encountered in the research context (E)
- Ability to organise own time and work, to meet deadlines, and manage competing priorities (E).

Essential Requirements (E) are those, without which, a candidate would not be able to do the job.

Desirable Requirements (D) are those which would be useful for the post holder to possess and will be considered when more than one applicant meets the essential requirements.

FURTHER INFORMATION

The post is available from 1 September 2024 on a full-time basis for a fixed term period of up to 36 months.

Salary will be £36,333 to £43,155 per annum on Grade 7 on the single salary spine.

Place of Work - The University is supporting a hybrid-working pilot of at home and on campus 'hybrid' working for many roles. We encourage discussions about how your working arrangements can be agreed to best balance the needs of the role and your personal circumstances.

The flexibility of the hybrid-working model allows the possibility of remote working, but it is the expectation that all appointments will be UK based, with any overseas working agreed in advance by exception only.

There will be varying requirements for different roles, further details will be discussed at interview.

If successful you will be asked to show evidence of right to work in the UK prior to any formal offer being made. Non-British and non-Irish nationals entering the UK to undertake employment or who are currently in the UK will have to meet eligibility criteria under the points-based immigration system. The University may be able to provide sponsorship under the <u>Skilled Worker route</u> if relevant criteria are met.

The post is superannuable under the Universities Superannuation Scheme and there is an annual holiday entitlement of 30 days plus statutory (8 days) and customary (6 days) holidays. The University is committed to creating an environment where the health, welfare and safety of all students and staff is of paramount importance. The University's Safeguarding Policy addresses both child protection and safeguarding children, young people and vulnerable adults within the work of the University. Appointment will be subject to a satisfactory Occupational Health Assessment to be carried out by the University's Occupational Health Service.

Information on the benefits of working at UEA can be found

at https://www.uea.ac.uk/about/working-at-uea.

If you require the information contained within this candidate brochure in a different format please email staff.recruitment@uea.ac.uk

HOW TO APPLY

To apply for this vacancy, please follow the online instructions at: https://vacancies.uea.ac.uk

The closing date for this role is 11:59pm on 13 May 2024.

Please note that the application form contains an Equal Opportunities section which must be completed. The Equal Opportunities information will not be made available to the selection panel and will not form any part of either the short-listing or decision making process.

It is anticipated that interviews will take place via Microsoft Teams in **mid-June 2024** and if you have not heard by this date please assume you have not been shortlisted on this occasion.

Candidates should note that travel and incidental expenses incurred in attending an in-person interview will not be reimbursed.



ABOUT THE PROJECT

This position is part of the EPSRC Fellowship project EP/V032003/1 "Algorithmic, topological and geometric aspects of infinite groups, monoids and inverse semigroups"

https://gow.epsrc.ukri.org/NGBOViewGrant.aspx?GrantRef=EP/V032003/1

held by Dr Robert D. Gray. The main objectives of this project are to investigate algorithmic, logical, combinatorial, topological and geometric aspects of one-relator groups, monoids, and inverse semigroups, and related classes and then apply the results and theory we develop to explore the boundary between decidability and undecidability for finitely presented groups, monoids and inverse semigroups.

Ultimately this work will form a foundation from which we will attack several important longstanding open problems in this area. These objectives will be achieved by developing the following three interrelated research streams:

I) Word and membership problems - At the heart of this project is the study of a range of decision problems for one-relator groups, monoids, and inverse semigroups, and related classes. Decision problems that will be investigated include: the word problem, the subgroup and submonoid membership problems, the rational subset membership problem, and the prefix membership problem. The investigation of algorithmic problems in research stream (I) will be supported by the new theory in the topological, geometric and logical aspects of monoids and groups developed in research streams (II) and (III).

II) Topology, homology and geometry - Topological, homological and geometric methods play a key role in the study of one-relator groups and related classes. Knowledge of the topological and geometric properties of groups and monoids is important for investigating algorithmic problems. Among other things, in this research stream we will investigate homological and topological finiteness properties of one-relator monoids. We will also develop the theory of tree-like inverse monoids and apply it to the word problem for one-relator inverse monoids.

III) Diophantine problem, equations, and first-order theory - Several key algorithmic problems considered in this project are all special cases of a more general problem which asks whether there is an algorithm that decides whether a finite system of equations over a group, or monoid, has a solution. This is called the Diophantine problem. Among other things, in this research stream we will investigate whether the Diophantine problem is decidable for one-relator groups and/or one-relator monoids.

Solutions to the questions considered in this project would be important breakthroughs that would significantly advance our understanding of the algorithmic properties of groups and monoids.



ABOUT THE SCHOOL

Head of the School Emilian Părău

The School of Mathematics at UEA is a flourishing department committed to excellence in teaching and research. The School has an international reputation for its research across a broad range of pure and applied topics. Undergraduates benefit from the lively research climate in the department, and are taught by leading researchers in several different fields of mathematics.

More information about the School of Mathematics can be found at: http://www.uea.ac.uk/mathematics

Research and Enterprise

Research in the School is broad-based, interdisciplinary and of international quality. In the latest Research Excellence Framework, the School achieved significant gains in the reputation of its research and we were ranked 7th in the UK for the quality of our output – 100 per cent being deemed internationally recognised and 88 per cent as world leading or internationally excellent. All mathematics members of faculty were submitted for assessment, and we were ranked 11th in the UK for the intensity of our research.

Research in the School can be divided into Pure Mathematics, with themes in Algebra, Logic and Number Theory; and Applied Mathematics, with themes in Fluid-Structure Interaction, Industrial Mathematics, Mathematical Biology, and Quantum Fluids.

The School of Mathematics is committed to fostering an atmosphere of learning and working that welcomes and values the diversity of its students and staff. We have an active Equality, Diversity and Inclusion Committee with representation from across the School to respond to staff and student feedback, monitor data by protected characteristics and implement initiatives to ensure fairness and support for all. We are proud holders of an Athena SWAN Bronze Award in recognition of our commitment to gender equality.

For more information visit: www.uea.ac.uk/about/school-of-mathematics/work-here



ABOUT THE FACULTY

The Faculty of Science is home to a vibrant community of students, staff, and visitors. Our lively environment allows high quality, innovative research across a broad spectrum of themes. This vibrant culture provides a base for our research-led teaching and underpins all our activities from influence of government policy to presentations at local schools.

Our seven Schools of Study engage in world leading research. You can find out more about activities in our Schools on our Faculty information pages.

- · School of Biological Sciences
- · School of Chemistry
- · School of Computing Sciences
- · School of Environmental Sciences
- · School of Engineering
- · School of Mathematics
- · School of Pharmacy

Our Schools are bolstered by degree courses in Actuarial Science, Natural Sciences, Physics and Geography.

We are also part of the Aurora Network, a network united by our commitment to build a different kind of inclusive university community. Learn more about the Aurora University Network on their website.

"Science at UEA is remarkable for its collaborative, dynamic and ambitious outlook and we are looking for new faculty members who can both contribute to and benefit from this wonderful environment for research and teaching."

Professor Mark Searcey, Pro-Vice Chancellor Science



OUR VALUES

Shaped by staff, our UEA values represent a core set of standards for how we behave as an employer, drive excellence in teaching, learning and research, and collaborate as an anchor institution in our local community.

From tackling global challenges, striving for student and staff success, and creating a vibrant inclusive environment, our values are what unite us.

- **+** AMBITION
- → COLLABORATION
- **+** EMPOWERMENT
- + RESPECT



OUR VALUES (CONTINUED)



AMBITION

We are ambitious for our future success.

We are forward-thinking and brave in our approach and decisions. We make space for innovation and creativity, seizing opportunities that are responsible and sustainable. We are ambitious for the advancement of education and research.



COLLABORATION

We are collaborative in our approach.

We work together with shared purpose. We build connections, share ideas and develop new networks. We champion our regional, national and global relationships and demonstrate that together we can achieve greater goals and positively influence the world around us.



EMPOWERMENT

We empower ourselves and each other.

We develop ourselves and others, trusting people to make decisions based on their expertise and knowledge.

We continually improve systems and processes to support us in working in an agile and efficient way.



RESPECT

We respect each other.

We treat everyone with respect and dignity. We value diversity and foster a community where people can express different thoughts and views. We are open to challenge, so we can learn and improve. We encourage a positive, inclusive environment where everyone has opportunities to fulfil their potential.

RESEARCH AT UEA

REF21 results showed that 91% of our research is world leading or internationally excellent (The University of East Anglia: Results and submissions: REF 2021); and the Knowledge Exchange Framework (KEF) results show UEA as above average across most indicators in our Cluster-X grouping (Knowledge exchange framework: Dashboard (kef.ac.uk)).

UEA research is highly cited, the 6th most cited in the UK and 41st globally (THE Research Citations rankings 2022). Ten researchers associated with the Norwich Research park and seven researchers from UEA have been named in the annual <u>Clarivate Web of Science Group Highly Cited Researchers list for 2022</u>.

UEA is listed in the World Top 100 for research citations (Times Higher Education World University Rankings 2023) and World Top 50 (Times Higher Education Impact Rankings 2022).

REF21 Highlights - Top 20s

- 1st overall, 6th for outputs and 1st for impact for (Anthropology and) Development Studies (8th for research power)
- 1st overall, 2nd for outputs and 1st for impact for Agriculture, Food and Veterinary Sciences
- 3rd overall, 7th for outputs and 8th for impact for History

- 4th overall, 14th for outputs and 5th for impact
 for Earth Systems and Environmental Sciences
 (9th for research power)
- 4th overall, 9th for outputs and 1st for impact for Social Work and Social Policy
- 5th overall, 8th for outputs and 7th for impact for Area Studies

UEA is home to several world-renowned Research Centres and Networks

- Climatic Research Unit (CRU) <u>Climatic</u>
 <u>Research Unit Groups and Centres (uea.ac.uk)</u>
- Tyndall Centre <u>Homepage -Tyndall Centre for</u> <u>Climate Change Research</u>
- Norwich Institute for Healthy Ageing (NIHA) https://healthyageingnorwich.com/
- Centre for Japanese Studies & Sainsbury Institute for the Study of Japanese Art and Cultures https://www.sainsbury-institute.org/
- Biomedical Research Centre https://www.uea.ac.uk/groups-and-centres/biomedical-research-centre
- Centre for Competition Policy https://www.uea.ac.uk/groups-and-centres/centre-for-competition-policy

- Norwich Institute for Sustainable Development (NISD) <u>Home - The Norwich Institute for</u> <u>Sustainable Development (nisd.ac.uk)</u>
- Centre for Research on Children and Families (CCRF) https://www.uea.ac.uk/groups-and-centres/centre-for-research-on-children-and-families
- Water Security Research Centre (WSRC) <u>Water</u> <u>Security Research Centre - Groups and Centres</u> (uea.ac.uk)
- Productivity East https://www.uea.ac.uk/groups-and-centres/productivity-east

UEA houses the British Archive for Contemporary Writing (with material from renowned authors such as Doris Lessing and Lee Child), the nationally accredited East Anglian Film Archive, Sainsbury Centre for Visual Arts, Sainsbury Institute for the Study of Japanese Arts and Culture, and Sainsbury Research Unit for the Arts of Africa, Oceania and the Americas.

OTHER ACCOLADES

- Queen's Anniversary Prizes for Higher and Further Education have been awarded to UEA for international development studies (2009), creative writing (2011) and environmental sciences (2017). Notable alumni include Sir Paul Nurse (1973, Nobel Prize for Medicine 2001), Kazuo Ishiguro (1980, Nobel Prize for Literature 2017), Michael Houghton (1972, Nobel Prize for Medicine 2020) and Sarah Gilbert (1983) who led the Oxford University team to develop a COVID-19 vaccine, approved in 2020.
- Our Doctoral College, established in 2018, hosts six Doctoral Training Partnerships and integrates Faculty and School provision for 1600 Postgraduate Research Students (including those from across the Norwich Research Park), enabling collaboration and innovation.
- We recognise our global impact and were one of the first universities to declare
 a climate and biodiversity emergency in June 2019. Our sustainable campus,
 including over 50 acres of environmentally valuable parkland, is constantly evolving
 with ambitions to be 100% net zero by 2045 or sooner.
- UEA is a University of Sanctuary, an accreditation given to universities that show an
 ongoing commitment to creating a welcoming culture of inclusivity and awareness.
- UEA was awarded the Silver Athena SWAN Award in 2019, and all our Schools hold awards at Bronze or Silver.

A vibrant place to study, learn and work, UEA is a very special place.



A SUSTAINABLE UNIVERSITY

At UEA, we are now working to create a university that will be even better in the future, and we are working to achieve net zero carbon by 2045 (or earlier). Our Sustainable Ways vision is one of a resilient university – where consumption is efficient and self-generated energy supports low carbon goals, supported by a vibrant community of world-leading researchers and inspired graduates.

At a basic level, our sustainable development means that we try to balance the 'three pillars' of environmental, economic and social elements.

We challenge our environmental impact through on-site energy generation and a district heating and cooling network, reducing our reliance on grid electricity and therefore fossil fuels. We promote and use recycled and 'eco' products such as biological cleaning materials. We champion local suppliers and ethical causes, including Fairtrade and vegan products. We seek to ensure value for money in a holistic, whole-life costing sense in our new buildings and procurement contracts.

OUR INITIATIVES

Central campaigns, such as holiday shut-downs or awareness day events, support a whole-University approach to energy saving and other initiatives.

Follow us on Twitter @SustainableUEA



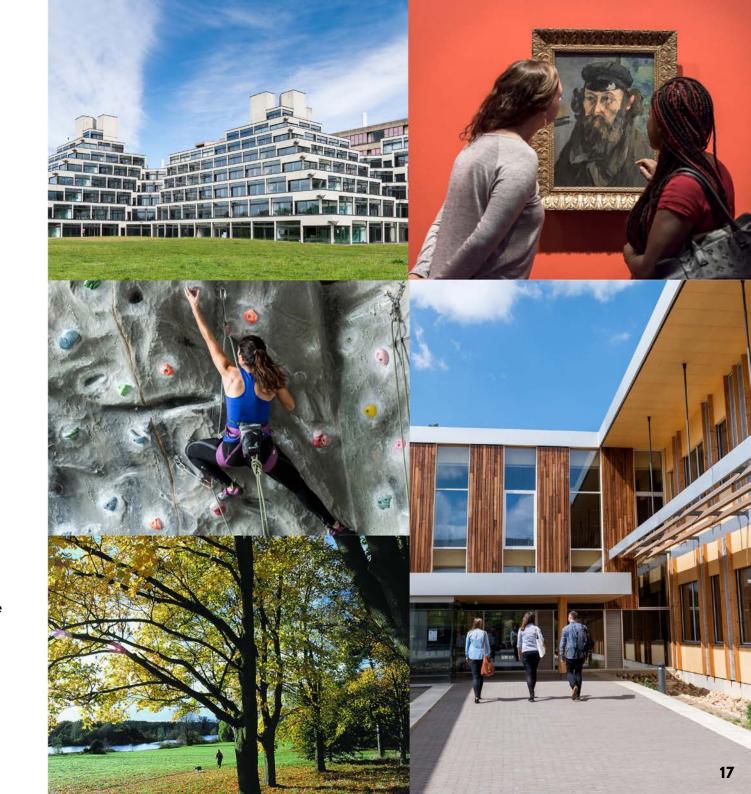
OUR CAMPUS

UEA is based on a campus that provides top quality academic, social and cultural facilities to over 17,000 students.

Although located in 320 acres of rolling parkland, virtually no part of the campus is more than a few minutes' walk from anywhere else, so everything is close at hand – the library, nursery, health centre, supermarket (incorporating a post office), banking facilities and restaurants. Amongst the striking buildings is the UEA's Sainsbury Centre for Visual Arts, which contains the Robert and Lisa Sainsbury Collection – one of the greatest art collections formed in Europe during the 20th Century.

The University has invested in new learning and teaching and research spaces, including a celebrated new Enterprise Centre that underpins its commitment to promoting student enterprise and entrepreneurship.

Sport and Recreation plays a major part in the life of the University of East Anglia, centred around the major Sportspark facility which is one of the most successful community sport facilities in the UK. This accessible and affordable facility provides a diverse range of activities, and incorporates a 50m Olympic size swimming pool, indoor climbing wall, coaching resource centre and sports injury clinic.



NORWICH

A CITY OF STORIES

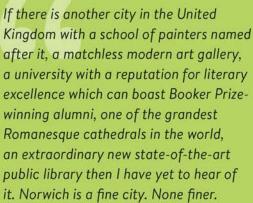
The city's motto is 'A fine city' and its strong cultural heritage has seen Norwich maintain the best of its historical character whilst developing to become one of the most vibrant and attractive cities in Europe. Norwich offers miles of riverside walks and cycle ways, and a unique collection of 1930's parks. The city is surrounded by beautiful countryside and within easy reach of the stunning Norfolk coast.

Norwich is a UNESCO World city of Literature, the first in the UK, as well as being one of the newly named Tech Cities recognising the growth of digital businesses in the region. The most prominent high-rise building, apart from the castle, is the magnificent 11th century cathedral, which still dominates the skyline. The city's medieval centre of cobbled streets remains largely intact, but there is still space for modern buildings such as the city's centrepiece, the Forum, which is a striking piece of contemporary architecture. The glass front overlooks the colourful open-air market (one of the largest in the country) and reflects the city in all its diversity.

The city is consistently rated as one of the top ten shopping venues in the UK. Norfolk and Suffolk attract thousands of visitors each summer. The famous Norfolk Broads are among the most important wetlands in Europe and a haven for rare plants, wildlife and insects. The Broads attract holidaymakers who come to navigate the intricate natural network of waterways formed by the Rivers Bure, Yare and Waveney and their tributaries.

For further information about UEA's excellent facilities, staff benefits, picturesque campus and the UEA working environment, please visit the 'Careers at UEA' microsite https://www.uea.ac.uk/about/working-at-uea. Additional information about living and working in the city of Norwich can be found at https://www.workinnorwich.co.uk/





STEPHEN FRY



LOCATION

Some cities you've heard of, others you have to discover. Norwich is one of the most beautiful, modern historic cities in Britain. It's a city that celebrates the independent, stimulates creativity, promotes change and encourages diversity.

UEA is a campus university located 3 miles from the centre of Norwich. Situated in the heart of Norfolk, which means it's an ideal location to explore Norwich and beyond.

BY RAIL

LONDON • 2 HOURS

CAMBRIDGE • 1 HR 15 MINS

BIRMINGHAM • 4 HOURS

Many European cities (including Paris and Amsterdam) easily accessible by train

BY ROAD

KINGS LYNN • 1 HOUR CROMER • 45 MINUTES SOUTHWOLD • 1 HOUR

BY AIR

NORWICH AIRPORT • 20 MINUTES

STANSTED AIRPORT • 2 HOURS

London is a major airline hub and all main international destinations are easily accessible



An internationally renowned university, UEA is ranked in the UK Top 30 (The Times/Sunday Times 2024, Guardian University Guide 2023 and Complete University Guide 2023) and the World Top 50 (Times Higher Education Impact Rankings 2023), where it ranks in the World Top 100 for research citations (Times Higher Education World University Rankings 2023), reflecting the international excellence of its research environment. The University holds UK Teaching Excellence Framework Silver status.

Equality, Diversity, Inclusion and Wellbeing

The University is committed to diversifying its workforce and to the wellbeing of all our staff. For example, we already hold an Athena Swan Silver Institutional Award in recognition of our advancement towards gender equality. Further details on our broader Equality, Diversity, Inclusion and Wellbeing work can be found on our website.

