**JOB DESCRIPTION**

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| Post title: | **Research Fellow in Statistics** | | |
| Academic Unit/Service: | Mathematical Sciences and the Alan Turing Institute (ATI) | | |
| Faculty: | Social, Human and Mathematical Sciences | | |
| Career Pathway: | Education, Research and Enterprise (ERE) | Level: | 4 |
| \*ERE category: | Research pathway | | |
| Posts responsible to: | Statistics Investigator (Prof. D. Woods), HoAU Mathematical Sciences and Director, S3RI. Data-Centric Engineering Programme Director (Prof. M. Girolami) at the ATI. | | |
| Posts responsible for: | No direct supervisory responsibilities | | |
| Post base: | Office-based | | |

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| Job purpose |
| To undertake research on the EPSRC-funded multidisciplinary project “CerTest” in collaboration with partners in the Alan Turing Institute, Engineering at Southampton and Engineering, Applied Mathematics and Statistics at the Universities of Bristol, Exeter and Bath.  This is a joint position between the University of Southampton and the Alan Turing Institute, employed on a multi-disciplinary grant to develop, implement and apply new methods for aerospace materials testing. The successful applicant would be based at Southampton but have the opportunity to spend substantial time (physically or virtually) at the Turing Institute in London as a member of the Data-Centric Engineering programme. The postholder will collaborate extensively with statisticians and mathematicians from the Universities of Bath and Exeter, and Engineers from the Universities of Bath, Bristol and Southampton.  The postholder will work on methods for uncertainty quantification in complex computer experiments for materials engineering. In particular, on one of more of the topics of (a) multi-model emulation and design of experiments (propagating uncertainty through linked computer models); (b) statistical calibration, and related design of experiments, for population parameters in mixed-effects computer models; (c) high-dimensional emulation (inputs and outputs). There will be opportunities to apply the methods to experiments performed by collaborating engineers, and to gain insight into their practical importance and relevance via the projects industrial partners.  CerTest – full title ‘Certification for Design - Reshaping the Testing Pyramid’ – is £6.9M research investment (programme grant) of the UK Engineering and Physical Sciences Research Council (EPSRC). CerTest is a close partnership between academic partners at the Universities of Bristol (lead), Bath, Exeter and Southampton, with strong industrial and stakeholder support from Airbus, Rolls Royce, BAE Systems, GKN Aerospace, Centre for Modelling and Simulation, the National Composites Centre and the Alan Turing Institute, and close interaction with the European Aviation Safety Agency. CerTest addresses barriers to validation and certification of composite aerostructures posed by the so-called ‘building block approach’ (or ‘testing pyramid’), which is the backbone of current validation and certification processes. CerTest represents a decisive step towards ‘virtual testing’ on the structural scale, which aims to reduce development cost and time to market, as well as to enable more structurally efficient and lightweight composite aerostructures that are essential for meeting future fuel and cost efficiency challenges.  To deliver the overarching objectives of CerTest it is necessary to develop methodologies that enable high-fidelity and robust testing of composite aero-structures on the component and sub-structure levels. A key part of the novel research will be to design the testing approach and to integrate the physical testing with multi-scale modelling in a closed feed-back loop, so that the models inform the choice of physical tests and the test outputs inform and update the models. |

| Key accountabilities/primary responsibilities | | % Time |
| --- | --- | --- |
|  | To investigate and develop new methods for Bayesian uncertainty quantification and design of experiments, especially for data fusion and model calibration including their implementation in appropriate computer code and the preparation of papers for publication in high-quality statistical journals. | 70 % |
|  | Collaborate with other team members on the application of the methods to appropriate engineering exemplars, including gaining the necessary subject area understanding. | 20 % |
|  | Carry out administrative tasks associated with specified research funding. | 5 % |
|  | Other duties as allocated by the line manager following consultation with the post holder (e.g. occasional teaching duties). | 5 % |

| Internal and external relationships |
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| The successful applicant will be a member of the Data-Centric Engineering programme at the Alan Turing Institute.  The successful applicant will collaborate with research teams in Engineering at Southampton and at the Universities of Bristol, Exeter and Bath.  The successful applicant will also be a member of the Southampton Statistical Sciences Research Institute. |

| Special Requirements |
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| To attend national and international conferences for the purpose of disseminating research results.  *Applications for Research Fellow positions will be considered from candidates who are working towards or nearing completion of a relevant PhD qualification. The title of Research Fellow will be applied upon successful completion of the PhD. Prior to the qualification being awarded the title of* ***Senior Research Assistant*** *will be given.* |

**PERSON SPECIFICATION**

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| Criteria | Essential | Desirable | How to be assessed |
| Qualifications, knowledge and experience | PhD in Statistics, Statistical Machine Learning, or Applied Mathematics or Engineering with an emphasis on uncertainty quantification.  Detailed understanding and knowledge of design of experiments, Bayesian computation/modelling, or statistical machine learning  High level of scientific programming skills, including experience of implementing statistical methods in computer code | Experience of multi-disciplinary research environments  Experience of programming in a low-level language (e.g. C/C++) | CV, references, interview |
| Planning and organising | Able to organise own research activities to deadline and quality standards | Ability to contribute to the planning and organisation of a research team | CV, references, interview |
| Problem solving and initiative | Able to develop understanding of complex problems and apply in-depth knowledge to address them, with input from Principal Investigator and collaborators where necessary  Able to develop original techniques/methods |  | CV, references, interview |
| Management and teamwork | Ability to work as part of a research team and contribute effectively to team goals |  | CV, references, interview |
| Communicating and influencing | Communicate new and complex information effectively, both verbally and in writing, engaging the interest and enthusiasm of the target audience  Able to present research results at group meetings and conferences  Able to write up research results for publication in leading peer-viewed journals | Ability to communicate and collaborate effectively within a multi-disciplinary team | CV, references, interview |
| Other skills and behaviours | Understanding of relevant Health & Safety issues  Positive attitude to colleagues and students |  | References, interview |
| Special requirements | Able to attend national and international conferences to present research results |  | Interview |

**JOB HAZARD ANALYSIS**

**Is this an office-based post?**

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| Yes | If this post is an office-based job with routine office hazards (eg: use of VDU), no further information needs to be supplied. Do not complete the section below. |
| No | If this post is not office-based or has some hazards other than routine office (eg: more than use of VDU) please complete the analysis below.  Hiring managers are asked to complete this section as accurately as possible to ensure the safety of the post-holder. |

## - HR will send a full PEHQ to all applicants for this position. Please note, if full health clearance is required for a role, this will apply to all individuals, including existing members of staff.

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| **ENVIRONMENTAL EXPOSURES** | **Occasionally**  (<30% of time) | **Frequently**  (30-60% of time) | **Constantly**  (> 60% of time) |
| Outside work |  |  |  |
| Extremes of temperature (eg: fridge/ furnace) |  |  |  |
| ## Potential for exposure to body fluids |  |  |  |
| ## Noise (greater than 80 dba - 8 hrs twa) |  |  |  |
| ## Exposure to hazardous substances (eg: solvents, liquids, dust, fumes, biohazards). Specify below: |  |  |  |
| Frequent hand washing |  |  |  |
| Ionising radiation |  |  |  |
| **EQUIPMENT/TOOLS/MACHINES USED** | | | |
| ## Food handling |  |  |  |
| ## Driving university vehicles(eg: car/van/LGV/PCV) |  |  |  |
| ## Use of latex gloves (prohibited unless specific clinical necessity) |  |  |  |
| ## Vibrating tools (eg: strimmers, hammer drill, lawnmowers) |  |  |  |
| **PHYSICAL ABILITIES** | | | |
| Load manual handling |  |  |  |
| Repetitive crouching/kneeling/stooping |  |  |  |
| Repetitive pulling/pushing |  |  |  |
| Repetitive lifting |  |  |  |
| Standing for prolonged periods |  |  |  |
| Repetitive climbing (ie: steps, stools, ladders, stairs) |  |  |  |
| Fine motor grips (eg: pipetting) |  |  |  |
| Gross motor grips |  |  |  |
| Repetitive reaching below shoulder height |  |  |  |
| Repetitive reaching at shoulder height |  |  |  |
| Repetitive reaching above shoulder height |  |  |  |
| **PSYCHOSOCIAL ISSUES** | | | |
| Face to face contact with public |  |  |  |
| Lone working |  |  |  |
| ## Shift work/night work/on call duties |  |  |  |