



**Economic and Social Research Council
North West Social Science Doctoral Training Partnership**

ESRC CASE Studentship for PhD Statistics or Social Statistics: *Characterising the influence of stakeholders on building energy consumption*

Lancaster University Department of Mathematics and Statistics are offering a fully funded, 3-year PhD position in Social Statistics. The position is funded through a CASE studentship at ESRC's North West Social Science Doctoral Training Partnership and it is in collaboration with an energy data services start-up company, DESCO Analytics.

Project Overview

The recent rise of research on big data has also shown that humans play a vital role in building operations, and often represent a bottleneck to better and faster decisions. For example, buildings' energy consumption is affected by the architects choosing the design; by the constructor choosing the types of materials used; by the energy management and maintenance personnel setting the operating thresholds and choosing when to conduct maintenance. All these are tied together by financial decision makers who wish to reach a safe operation with minimum costs. The overall energy consumption of the building is thus the result of a mixture of influences of all stakeholder groups, sometimes with conflicting goals, and design and operating decisions that can be static or change over time. Characterising the influence of stakeholder groups on energy efficiency presents both considerable challenges and considerable opportunities.

This project aims to develop advanced quantitative methods to identify and quantify the relationships of a range of stakeholder groups on the energy consumption of a building. These stakeholder groups include building occupants, maintenance providers, facility managers, designers and financial decision makers. For this project, DESCO Analytics (DA) – in the process of creating an energy analytics and intelligence suite for Lancaster University (LU) – are providing real-world data from a living and working campus for more than 15,000 people each day, comprised of over a 100 buildings.

While energy data analysis is not new, gaining actionable insight using conventional methods and software suites poses several challenges. Not only is modern data too large in size, it is also fairly complex, and subject to noise. The analysis and interpretation of the results are highly non-standard and span multiple domains. Therefore, in addressing these challenges, the candidate will investigate the use of **High-Dimensional Statistics and Functional Data Analysis (FDA) approaches as advanced statistical modelling techniques.**

Candidate background

We are seeking a strong and motivated candidate with the following attributes:

Essential

- A MSci or MSc degree from a reputable institution in Mathematics, Statistics, Data Science or a related field, obtained by September 2018 with at least a Pass (60%) degree.
- Some background in data science-related coding languages: python (preferred), R, Stata, Matlab or C
- Good command of the English language
- Preferably a top 10% finish in class or similar
- Able to work in an international team
- Able to work independently with limited guidance for extended periods of time
- Ready to solve problems and proactively ask questions and look for answers
- Flexible to manage the more independent schedule of academia and the fast-paced environment of a start-up

Desired

- Some knowledge of energy vectors and process management preferred
- Experience in working with incomplete, irregular, real-world time series datasets
- Demonstrated people management and interaction skills (e.g. managed a club or a student society, internship or similar experience, etc.)
- Working experience with big data platforms (Hadoop, Hortonworks, Cloudera)
- Demonstrated experience working in a Linux environment (Apache, Docker)

Supervisors

The candidate will be jointly supervised by Dr. Juhyun Park (Mathematics and Statistics) and Dr. Denes Csala (DA data scientist). The supervising team will bring extensive experience in nonparametric regression and smoothing methods, time series data analysis and longitudinal and functional data analysis, energy analytics, complex sociotechnical systems, machine learning and data visualization.

Starting date: Jan 2019

How to Apply:

In the first instance, interested candidates are advised to send their CV and transcripts to Dr. Juhyun Park (juhyun.park@lancaster.ac.uk) for advice and further information.

Formal application needs to be submitted by **1 Nov. 2018** for PhD Statistics **with entry Jan 2019**

<http://www.lancaster.ac.uk/maths/postgraduate/postgraduate-research/how-to-apply/>

In the 'Personal Statement', please write one page of your suitability for this research project, headed 'Characterising the influence of stakeholders on building energy consumption'. All shortlisted candidates will be invited to interview at Lancaster University in early November.