

## PhD Studentship: Global Sensitivity Analysis for Models with Constraints

Department of Chemical and Process Engineering, University of Surrey, Guildford, UK

**Start date: October 2017**

Applications are invited for a fully funded PhD studentship within the Department of Chemical and Process Engineering at the University of Surrey (<https://www.surrey.ac.uk/department-chemical-process-engineering>). The project will be jointly supervised by Dr Oleksiy Klymenko (University of Surrey) and Dr Sergei Kucherenko (Imperial College London).

With the ever increasing scale, scope and complexity of mathematical models in various scientific and engineering contexts, there is a growing need for efficient methods of model analysis, particularly taking into account potential uncertainties in model inputs and outputs. While uncertainty analysis focuses on quantifying uncertainty in model output, sensitivity analysis aims to assess quantitatively the effects of different sources of uncertainty in model inputs on the uncertainty of model output(s). The results of (global) sensitivity analysis may be used for model simplification, prioritisation of inputs for further analysis, assessment of parametric identifiability and the identification of the most influential inputs or those leading to extreme values of outputs, with implications for system reliability and model-based predictive control. Although variance-based methods of global sensitivity analysis have become very popular with the development of Sobol' sensitivity indices, only recently were they extended to the case of dependent model inputs. However, they do not cover models with equality or inequality constraints imposed on (some of) the model inputs and/or outputs, which can reflect limitations imposed, for example, by conservation laws, economic/budgetary restrictions, product quality constraints, etc. The objective of this PhD project is to extend the existing variance-based methods of global sensitivity analysis to this much wider range of models subject to equality and inequality constraints.

**Eligibility:** A First Class or Upper Second Honours degree (or equivalent overseas qualification) in an appropriate discipline (e.g., engineering, computer science, applied mathematics, physics). You should be able to demonstrate excellent mathematical, analytic, programming skills. Previous experience in numerical analysis, particularly Monte Carlo methods, and statistics would be advantageous.

**Funding notes:** Funding is available for UK or EU nationals **only** and covers full University tuition fees (home rate) and provides a stipend (rate for 2017-2018 is £14,553 p.a. tax-free). The award will be for a period of 3 years starting from Oct 2017. Self-funded applicants are also welcome to apply.

**How to apply:** Please send a cover letter explaining your interest in and qualifications for the project, a CV, a copy of your most recent academic transcript, published work such as journals and conference articles, and the names and contact details of two referees. Applications and informal enquiries should be sent via e-mail to Dr Oleksiy Klymenko ([o.klymenko@surrey.ac.uk](mailto:o.klymenko@surrey.ac.uk)). Non-native speakers of English will normally be required to have IELTS 6.5 or above (or equivalent). Shortlisted applicants will be contacted directly to arrange a suitable time for an interview.

### Contact Details:

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