Imperial College London

Survey on interest for MSc in Complexity Science at Imperial College London, U.K.

We want to know whether you are interested in undertaking an MSc in Complexity Science at Imperial College London. We would be grateful if you can reply to this survey by 1 October 2009 as this will help us to set up the MSc in Complexity Science. If there is sufficient interest, we aim to commence the MSc in Oct. 2010.

Aims and objectives: We are considering setting up an MSc in Complexity Science at Imperial College London renowned for its vision, rigour, imagination, and originality in transformative applied research in engineering, medicine and social sciences. Our objective is to train a new breed of researchers with appropriate quantitative skills to ensure that the necessary know-how in complexity science is available to real-world challenges.

Research area: The problems facing society are becoming increasingly complex since the plenitude of interaction often renders standard modelling inadequate, hindering forecasting and control. Failure to understand the interrelationships in the networks involved can be catastrophic. We are developing new approaches to real-world challenges encountered in engineering, medicine and social sciences because a proper understanding of design, management, uncertainty and risk at systems level is necessary to predict and possibly control outcomes in an increasingly multiplex and interconnected world. The generic methods and tools needed for analysis are correspondingly demanding and interdisciplinary. Our proposed MSc in Complexity Science would be a unique opportunity for students to enter a vibrant educational research environment that will train the next generation of complexity scientists to work in engineering, medicine, and social sciences.

MSc staff: Imperial is already established internationally in complexity science. The MSc staff will include: Prof. B. Rustem (Computing), Prof. K. Christensen (Complexity Science), Prof. H.J. Jensen (Complexity Science), Prof. K. Leung (Computing and Electrical & Electronic Engineering), Dr. P. Panzarasa (Sociology, Queen Mary), Prof. N. Peters (Medicine), Prof. E. Pistikopoulos (Chemical Engineering & Chemical Technology), Prof. J. Polak (Civil & Environmental Engineering) and Dr. G. Pruessner (Mathematics). The course director would be Prof. Kim Christensen.

Training: The MSci on Complexity Science will consist of a taught element consisting of 8 assessed core courses, concentrated in two intensive 5-week programmes where the students will be introduced to principles, theory, concepts, methods and tools required in the analysis of complex systems followed by research projects.

Taught element. 1) Mathematical Methods I: Introduction of concepts & tools in equilibrium statistical mechanics & dynamical systems. 2) Modelling Language I: Tools to construct quantitative models. 3) Meta-Methods: Understanding theories & models in science. 4) Research Methods: Construction of mathematical descriptions & techniques for investigating complex systems. 5) Mathematical Methods II: Concepts & tools in non-equilibrium statistical mechanics, networks & pattern formation. 6) Modelling Language II: Co-evolution, multi-agent systems & adaptation. 7) Process Design and Control: Process design & manoeuvring of complex systems. 8) Real-World Case Studies: Application of acquired theory & methods.

Research projects: The core courses are followed by supervised research projects of 5 & 20 weeks duration, respectively. The projects will develop the students' ability to apply complexity analysis to real-world problems.

Practical arrangement: We would be flexible with regard to how the MSci in Complexity Science is taken. (a) Both the taught element and the research projects could be taken at Imperial. (b) However, it would be possible to take the taught element (core courses) at Imperial while the research projects are done elsewhere. (c) Also, it would be possible to take the taught element through distance learning and the research projects elsewhere.

Fees and living costs: If the taught MSc in Complexity Science were beginning this year, the fees would be £3,390 for full-time EU-students and £18,200 for overseas students. Next year they would probably be a little more. Living costs in London would be approximately £15,000 for the 12 months. We emphasize that we are unable to offer any funding for fees or living costs.

Communication: Please send an e-mail to Prof. Kim Christensen (k.christensen@imperial.ac.uk) to register your interest in undertaking an MSc in Complexity Science stating (1) whether you are an EU or overseas student and (2) which practical arrangement (a), (b) or (c) you would consider.

Further information: Please visit www3.imperial.ac.uk/mathsinstitute/programmes/research/complexity.