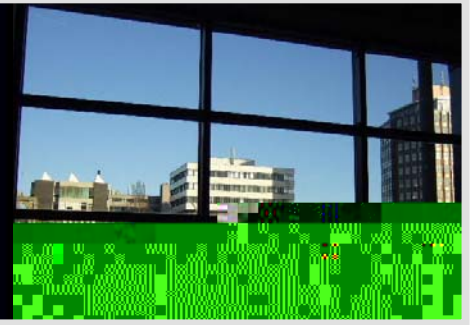




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Complex Networks across the Natural and Technological Sciences

The Complex Networks Programme consists of three seminars taking place in January, April and May 2009 at the Institute for Advanced Studies. The third of these events is:

Applications of Complex Networks: May 25th - 29th 2009

The Institute for Advanced Studies, 75 Montrose Street, Glasgow, Scotland, U.K.

Complex networks have become a focus of research exploring emergent phenomena that characterise the structure of real systems. Applications of complex networks are numerous and range from genetics to traffic patterns, from oscillators to the worldwide web.

In this workshop we connect the fundamental and dynamic properties of complex network to real examples taken from natural, technological and social sciences. We will travel from mathematical modelling and network topology to the study of information mobility, extreme events, protein genomics, traffic jams, the internet, coupled oscillators and many more complex phenomena.

Invited speakers in alphabetical order include: **Marc Barthelemy** (CEA, France) "Dynamical Evolution of Networks" and "Structure of Transportation Networks", **Ernesto Estrada** (Strathclyde, UK) "Information Mobility in Complex Networks", **Alessandro Flammini** (Indiana, USA) "The Web-graph: from Complex Topology to Complex Traffic Patterns", **Leon Glass** (McGill, Canada) "Dynamics in Genetic Networks: Evolution and the Inverse Problem", **Peter Grassberger** (Calgary, Canada) "Inference of Gene Interaction Networks by Conditional Mutual Information", **Des Higham** (Strathclyde, UK) "Matrix Computations and Complex Networks", **Henrik Jensen** (Imperial College, UK) "Evolution and Dynamics of and on Networks and its Relation to Network Structure", **Holger Kantz** (Dresden, Germany / Aberdeen, UK) "Extreme Events in Complex Systems: Origin and Prediction", **Antonio Politi** (Florence, Italy) "Collective Dynamics in Networks of Oscillators".

As well as a number of invited participants, the programme organisers welcome applications to attend and participate from those with an interest in this area. There is no registration fee for the workshop and we are able to cover some travel and accommodation costs of the attendees.

If you wish to participate, please contact: Gian-Luca Oppo (g.l.oppo@strath.ac.uk).

The Complex Networks Programme is organised by D. Higham, M. Fox, G.-L. Oppo, and E. Estrada.

The **Institute for Advanced Studies** is a place for unconstrained thinking, where ground-breaking concepts can be developed and explored, with the aim of enhancing the culture and society of Scotland and the UK, and their future scientific and technological capabilities. The Institute funds programmes of research that bring together key participants from around the world to a physical location in central Glasgow. By crossing disciplinary boundaries, and with knowledge exchange with the public at their heart, research programmes aim to inform public policy and practice. Research programmes in the Institute are free to all participants.

The Institute was launched with a series of high-profile and timely research programmes, connecting with issues of public concern and relevance to Scotland and the UK, in January 2009.

For further details on this and other programmes please visit www.instituteforadvancedstudies.org.uk



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Applications of Complex Networks: May 25th - 29th 2009

Programme:

Monday 25 May 2009: Arrival Day

Tuesday 26 May 2009:

9:00-9:15 G.-L. Oppo: Introduction and Welcome
9:15-10:15 **Ernesto Estrada** (Strathclyde, UK) "Information Mobility in Complex Networks"
10:15-11:00 *Coffee Break and Informal Meetings*
11:00-12:00 **Marc Barthelemy** (CEA, France) "Dynamical Evolution of Networks"
12:00-12:30 Discussion 12:30-14:00 *Lunch*
14:00-15:00 **Antonio Politi** (Florence, Italy) "Collective Dynamics in Networks of Oscillators"
15:00-15:45 *Coffee Break and Informal Meetings*
15:45-17:30 **Round Table 1: Open Problems in Complex Networks**

Wednesday 27 May 2009:

9:00-9:15 Information and Updates
9:15-10:15 **Peter Grassberger** (Calgary, Canada) "Inference of Gene Interaction Networks by Conditional Mutual Information",
10:15-11:00 *Coffee Break and Informal Meetings*
11:00-12:00 **Leon Glass** (McGill, Canada) "Dynamics in Genetic Networks: Evolution and the Inverse Problem"
12:00-12:30 Discussion 12:30-14:00 *Lunch*
14:00-15:00 **Henrik Jensen** (Imperial College, UK) "Evolution and Dynamics of and on Networks and its Relation to Network Structure"
15:00-15:45 *Coffee Break and Informal Meetings*
15:45-17:30 **Short Talks** (5 or 10 or 15 minutes each. Please inform G-L Oppo if you intend to give a short talk)
19:00 *Workshop Dinner*

Thursday 28 May 2009:

9:00-9:15 Information and Updates
9:15-10:15 **Alessandro Flammini** (Indiana, USA) "The Web-graph: from Complex Topology to Complex Traffic Patterns"
10:15-11:00 *Coffee Break and Informal Meetings*
11:00-12:00 **Holger Kantz** (Dresden, Germany / Aberdeen, UK) "Extreme Events in Complex Systems: Origin and Prediction"
12:00-12:30 Discussion 12:30-14:00 *Lunch*
14:00-15:30 **Round Table 2: Tools and mathematical methods to analyze Complex Networks**
15:30-16:00 *Coffee Break and Informal Meetings*
16:00-17:30 **Debate: Are there problems with the concept of 'Scaling' in Complex Networks?**

Friday 29 May 2009:

9:00-10:00 **Des Higham** (Strathclyde, UK) "Matrix Computations and Complex Networks"
10:00-10:30 *Coffee Break and Informal Meetings*
10:30-11:30 **Marc Barthelemy** (CEA, France) "Structure of Transportation Networks"
11:30-12:30 **Concluding Discussion**
12:30 *Lunch and Discussions and Departures*