The LTCC

The LTCC fosters the training of doctoral research students in the Mathematical Sciences. Its courses cover the areas of Statistics, Applied Mathematics and Pure Mathematics, with the aim of providing students with an overview of these areas, and of acquiring a working knowledge of classical results and recent developments in their own broad research fields but outside the specialised domains of their individual research projects. There is a wide range of expertise among the staff of the institutions currently in the LTCC consortium: UCL, Queen Mary, Imperial College (Statistics), King's College, LSE, City, Kent, Brunel and Royal Holloway (Statistics).

The LTCC programme, which is supported by the UK Engineering and Physical Science Research Council, emphasises direct teaching and personal contact rather than distance learning. The programme includes modular lecture courses and short intensive courses.

LTCC lectures take place at De Morgan House, which is located on the south side of Russell Square, within walking distance of Euston Station, and Russell Square, Holborn and Euston Square tube stations. A detailed map is available on the LTCC website: www.ltcc.ac.uk

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London Taught Course Centre

Basic courses 2012-2013

for PhD students in the mathematical sciences

LTCC

London Taught Course Centre

Basic Courses 2012-2013

October 1st — October 29th 2012

Models
Dr O. Kerr, City

This course examines basic principles behind modeling, and looks at a variety of qualitative and quantitative models and their application.

Measure-theoretic Probability
Professor N.H. Bingham, Imperial and LSE

This course gives a self-contained introduction to measure-theoretic probability and stochastic processes, including martingales, diffusions and Brownian motion.

Representation Theory
Dr A. Cox, City

An introduction to results from classical and modern representation theory for finite dimensional algebras.

November 5th — December 3rd 2012

Stochastic Processes
Dr J. Nelson, UCL

An introduction to the main ideas and methods of applied probability. Topics will include Markov processes, point processes and epidemic models.

C*-algebras
Professor C-H. Chu, QMUL

An introduction to C*-algebras and their representations on Hilbert spaces, as well as the classification of von Neumann algebras.

Reimann Surfaces
Dr J. Armstrong, KCL

An introduction to Reimann Surfaces emphasising the interplay between calculus and Topology.

Algebraic Topology
Dr I. Tomasic, QMUL

Some of the most beautiful research in pure mathematics of the 20th century was motivated by Weil conjectures for zeta functions of algebraic varieties over finite fields. This course will introduce students to enough Algebraic Geometry to be able to understand some elementary aspects of their proof for the case of algebraic curves and appreciate their number-theoretic consequences.

January 14th — February 11th 2013

Applied Bayesian Methods
Dr J. Xue, UCL

Introducing the Bayesian approach to statistical inference and developing relevant theory, methodology and computational techniques for its implementation.

Graph Theory
Professor J. van den Heuvel and Dr J. Skokan, LSE

Discusses the major results of graph theory and provides an introduction to the language, methods and terminology. Emphasizes various fruitful approaches to modern graph theory.

Wave Scattering Resonances
Dr D. Savin, Brunel

The aim of this course is to provide an introduction to the theory of resonance scattering waves, beginning with classical fields and going on to non relativistic quantum scattering.

February 18th — March 18th 2013

Fundamental Theory of Statistical Inference
Professor A. Young, Imperial

Approaches to statistical inference, decision theory, Bayesian methods, special families of models, principles of inference and data reduction, and key elements of frequentist theory.

Statistical Modelling and Estimation
Dr H. Grossmann, QMUL

Covers the theory of linear models, with an emphasis on estimation and inference.

Applied Dynamical Systems
Dr W. Just, QMUL

Reviews some basic concepts of dynamical systems theory, like stability and bifurcations, chaos and complex dynamics in time discrete maps, or computational techniques for nonlinear systems.

Internal Fluid Dynamics
Prof F Smith, UCL

Motivated by a range of applications this course is on constriction/distortion and branching in vessels containing fluid motion, with asymptotic approaches and matching yielding much insight.

Further information, full text syllabi, registration form, and timetables are available online at: http://www.ltcc.ac.uk
or contact us for further enquiries at: office@ltcc.ac.uk

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London Taught Course Centre

Advanced courses 2012-13

for PhD students in the mathematical sciences

LTCC

London Taught Course Centre

Advanced Courses

October 1st — October 29th 2012

Non-Linear Free Surfaces
Professor J-C Vanden-Broeck, UCL

The course will mostly cover analytical aspects of free surface (moving boundary) problems in the presence of different levels of nonlinearity. Some related numerical properties may also be presented, along with various real applications.

The Probablistic Method
Dr J. Talbot, UCL

This course will give an overview of the powerful non-constructive proof technique pioneered by Paul Erdos with applications in combinatorics, graph theory, number theory, analysis and linear algebra.

November 5th —December 3rd 2012

Integrability
Dr B. Doyon, KCL

This course will give an overview of some of the ideas behind integrability, and their applications to four areas of theoretical physics: finite dynamical systems, classical field theory, quantum chains and quantum field theory.

Likelihood and asymptotic theory for statistical inference
Dr N. Reid, Toronto and UCL

An overview of asymptotic theory based on the likelihood function, and discussion of extensions of likelihood for complex models.

Differential Algebra
Dr M. Rozenkrantz, Kent

Symbolic computation tools for solving and simplifying differential equations are becoming increasingly common. The aim of this course is to understand their algebraic foundations to maximise the benefits of existing computer algebra commands and packages **(This course will take place at Kent University on 7th and 14th November, 11am—5pm.)**

January 14th — February 11th 2013

Advanced Computational Methods in Statistics
Dr A. Gandy, Imperial

A survey of advanced computational methods in statistics, including (stochastic) optimization, (adaptive) MCMC, perfect sampling, bootstrapping and particle filtering. Parallel implementations are considered.

Differential Equations with Delay and Applications to Mathematical Biology
Dr J. Furter, Brunel

Bio-mathematics modelling leads naturally to differential equations with delay mechanisms. We discuss the main ideas used to apprehend them, illustrated by significant examples, including the differences with systems without delay.

Spectral Theory for Operators
Professor B. Davies, KCL

This course is an introduction to the many aspects of spectral theory for both self-adjoint and non-self-adjoint linear operators and in particular for differential operators. It is hoped, but not required, that students will be familiar with the spectral theorem for self-adjoint operators.

Symmetry Methods
Professor P. Clarkson, Kent

This course is concerned with symmetry reductions of partial differential equations, which are obtained by seeking solutions in special forms or using group theoretical, highly algorithmic techniques.

Introduction to Random Matrix Theory
Dr I. Smolyarenko, Brunel

An introduction to the main ideas of random matrix theory, and a survey of the key methods and results.

Further information, full text syllabi, registration form, and timetables are available online: http://www.ltcc.ac.uk
or contact us for further enquiries.

February 18th — March 18th 2013

Holomorphic Dynamics and Hyperbolic Geometry
Professor S. Bullett, QMUL

Kleinian groups are discrete subgroups of $PSL(2,\mathbf{C})$, acting as conformal automorphisms of the Riemann sphere or isometries of 3-dimensional hyperbolic space. The aim of the course is to introduce some of the main techniques and results in the two areas, emphasising the strong connections between them.

Modular Forms
Professor F. Diamond, Kings

Modular forms are holomorphic functions on the complex upper-half plane satisfying certain transformation properties with respect to the subgroups of $SL2(\mathbf{Z})$. They play an important role in many areas, including number theory. The course will cover: Elliptic curves, Modular curves, Hecke operators and L Functions.

Mathematical Problems of General Relatvitiy
Dr J A Valiente Kroon, QMUL

This course will provide a general discussion of General Relativity as an initial value problem. In addition, it will serve as an introduction to applied methods of Differential Geometry and Partial Differential Equations.

Applications of Differential Geometry to Mathematical Physics
Dr A. Hone & Dr S. Krusch, Kent

Introducing concepts in differential and complex geometry and providing a dictionary between physics and mathematics (gauge theory and fibre bundles). **(This course will take place at Kent University, date tbc.)**

Statistical Pattern Recognition
Dr G. Montana, Imperial

The lectures will focus on feature extraction, dimensionality reduction, data clustering and pattern classification and state-of-the-art approaches such as support vector machines and ensemble learning methods. Real-world applications will illustrate how the techniques are applied to real data sets. **(This course will take place at UCL, date tbc.)**