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 goals 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 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.

LTCC
De Morgan House
57-58 Russell Square
London WC1B 4HS

Office address:
LTCC
Department of Mathematics
University College London
Gower Street
WC1E 6BT

E-mail: office@ltcc.ac.uk
http://www.ltcc.ac.uk

London Taught Course Centre

Advanced courses 2011-2012

for PhD students in the mathematical sciences

LTCC

London Taught Course Centre

Advanced Courses 2011-12

October 3 — October 31

Model Theory

Dr I. Tomašić, QMUL

An introduction to model theory with a view to the recent spectacular applications of logic in number theory and Diophantine geometry.

November 7 — December 5

Statistical Mechanics

Professor C. Beck, QMUL

An introduction to the formalism of statistical mechanics as applied complex systems. Topics include generalized versions of statistical mechanics and the connection with the theory of dynamical systems.

Environmental Flows

Dr M. Davey, UCL

Simplified mathematical models of some large-scale atmospheric and oceanic flow features will be presented, using geophysical fluid dynamics.

Constant Mean Curvature

Dr G. Tinaglia, KCL

The course will examine the theory of constant mean curvature surfaces, focusing on three classical theorems: Hopf's Theorem, Alexandrov's Theorem and Barbosa-Do Carmo's Theorem.

All lectures take place at De Morgan House

Topological Arakelov Theory

Professor F.E.A. Johnson

We consider the topological description of varieties which fibre over a complex curve with fibre a quasi projective variety and compare this with the group theoretic analysis of the corresponding extension of fundamental groups

Industrial Mathematics

Drs R. Leese and D. Allright, KTN

This will be an interesting and up to date course on the subject, for which a full description should be on the website shortly. **Please note that this course will take place on 24 November and 1 December at 11.00–17.00.**

January 16 — February 13

Advanced Computational Methods in Statistics

Dr A. Gandy, Imperial

This course surveys some advanced computational methods in statistics, including parallel computing, variance reduction techniques, (stochastic) optimization, MCMC, perfect sampling, bootstrapping and particle filtering.

Complex Analysis

Professor R. Halburd, UCL

The course will cover the value distribution of meromorphic functions (Nevanlinna theory), special functions in the complex domain, the monodromy group and an introduction to Riemann-Hilbert problems.

Inverse Problems

Professor Y. Kurylev, UCL

This course will introduce the mathematical theory of inverse problems. We will draw upon approaches to multi-dimensional inverse problems, particularly the Boundary Control method, and apply them to one-dimensional inverse problems.

February 20 — March 19

Distribution and Fourier Transforms

Professor Y. Safarov, KCL

The course will introduce students to the modern technique of microlocal analysis. It will cover such topics as Fourier transform, Schwartz distribution, pseudodifferential operators, and will discuss some applications to partial differential equations.

Introduction to Semiparametric Modelling

Dr C. Lam, LSE

The course introduces the solid theories and practical usage of several important semiparametric modelling techniques, with examples given throughout the course. Statistical inference and the fitting of different type of models in practice, including generalized additive mixed or varying coefficient model, will be considered.

Solid Mechanics, Including Elastic Wave Propogation

Professor J. Kaplunov, Brunel

The course deals with the basics of Solid Mechanics with the focus on asymptotic modelling of dynamic phenomena in elastic media.

Statistical Pattern Recognition

Dr G. Montana, Imperial

The lectures will focus on feature extraction, dimensionality reduction, data clustering and pattern classification and state-of-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. **Please note that this course will take place on the 12, 19 and 26 March and 2 April at 15.30–17.30.**

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

Basic Courses 2011-2012

October 3 — October 31

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.

Bio-Mathematics
Dr S. Baigent, UCL

Global dynamics of Lotka-Volterra systems, Lotka Volterra population models, competition/predator-prey/cooperative, Picard theory for odes, Omega limit sets, existence and uniqueness of steady states etc.

Models
Dr O. Kerr, City

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

Geometric Group Theory
Professor I. Chiswell, QMUL

Basic constructions (free groups, free products with amalgamation, HNN-extensions), their applications and connections to geometry, via CW-complexes, manifolds, etc., will be considered. Bass-Serre theory will also be discussed briefly.

Algebraic Topology
Dr L. Hodgkin, Kings

An introduction to algebraic topology - the fundamental group, homology and homotopy theory, with some applications including the classification of surfaces.

November 7 — December 5

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.

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.

January 16 — February 13

***p*-adic analysis**
Dr S. Sasaki, KCL

The aim of this course is to explain basic properties of non-archimedean fields, e.g., the *p*-adic numbers, and to give an introduction to *p*-adic analysis.

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.

Analytical Methods
Dr H.Wilson, UCL

Examines PDEs and perturbation theory: dimensional analysis and similarity solutions, characteristics, complex variable methods, matched asymptotics and steepest descents.

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.

February 20 — March 19

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.

Potential Theory
Professor B. Khoruzhenko, QMUL
Potential theory is concerned with the study of harmonic functions (solutions of Laplace's equation). This course will introduce potential theory and its applications in approximation theory and complex dynamics.

Complex Systems Dynamics
Dr H. Fry, UCL

The analysis of complex systems requires tools originating in game theory, statistical mechanics, non-linear dynamics and network analysis. This course aims to give an overview of the field of study, using case studies (particularly those of social systems) to demonstrate the broad range of techniques and possible practical applications.

All lectures take place on Mondays at De Morgan House

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