

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:

- Departments of Mathematics and Statistics, UCL
- The School of Mathematical Sciences, Queen Mary University of London
- Department of Mathematics, Imperial College London
- Department of Mathematics, King's College
- Departments of Mathematics and Statistics, LSE
- Departments of Mathematics, City, University of London
- SMSAS, University of Kent
- Department of Mathematics, Brunel University London
- Department of Mathematics, Royal Holloway University of London
- School of Mathematics and Statistics, Open University.

The LTCC programme emphasises direct teaching and personal contact rather than distance learning, and includes modular lecture courses and short intensive courses.

Note: A fee is payable by students from non-LTCC departments.

Lecture venue (unless otherwise stated):

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

**Office address:
LTCC**

**Department of Mathematics
University College London
Gower Street
London WC1E 6BT**

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www.ltcc.ac.uk**

Basic courses 2017-2018

**for PhD students in the
mathematical sciences**

LTCC

London Taught Course Centre

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Basic Courses 2017-2018

October 9th – November 6th 2017

Class Field Theory

Dr M. Kakde, KCL

The course will be a quick introduction to class field theory and will draw upon Jürgen Neukirch's book *Class Field Theory*. Some familiarity with basic algebraic number theory, such as that covered in Daniel Marcus's *Number Fields*, will be assumed. **(Please note that this course will take place at KCL on 9, 16, 23 and 30 Oct and 6 Nov).**

Stochastic Processes

Prof M. De Iorio, UCL

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

(Venue for lectures TBC)

Exact Solution Methods for Differential Equations

Prof R. Halburd, UCL

This course will introduce two methods for finding (in some sense) explicit solutions to ordinary and partial differential equations. The first half of the course will concentrate on Lie's symmetry method. Most of the explicit methods seen in standard courses are special cases of this approach. The second approach uses singularity structure, in particular the Painlevé property, to identify integrable differential equations and to find special solutions.

(Venue for lectures TBC)

November 13th – December 11th 2017

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.

Fundamental Theory of Statistical Inference

Prof A. Young, Imperial

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

January 15th – February 12th 2018

Analytical Methods

Dr N. Ovenden, UCL

This course examines PDEs and perturbation theory, dimensional analysis and similarity solutions, characteristics, complex variable methods, matched asymptotics and steepest descents.

Applied Bayesian Methods

Dr J. Xue, UCL

This course introduces the Bayesian approach to statistical inference and relevant theories, methodologies and computational techniques for its implementation.

Low Dimensional Topology

Dr P. Cassels, UCL/MIT

This course is an introduction to the study of knots and links in the 3-sphere. We will discuss constructions in geometric topology and the art of extracting invariants of knots and manifolds. The exposition will be based in concrete examples and pictures, lots of pictures.

Elliptic Operators and Index Theorem (Part I)

Prof M. Singer, UCL

A fundamental result in the theory of linear differential equations is the so-called 'Fredholm package' for elliptic operators on compact manifolds. This is really a collection of theorems including the smoothness of solutions and finite-dimensionality of the solution space. In Part I of the course, the basics of differential operators on manifolds will be explained, and proofs will be given of the 'Fredholm package', using the machinery of pseudodifferential operators. Hodge theory will be discussed, along with other naturally occurring examples.

(Note: This course list is subject to change. Please visit www.ltcc.ac.uk/timetable to check the latest version , including the venue of lectures.)

Wave Scattering and Resonances

Dr D. Savin, Brunel

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

February 19th – March 19th 2018

Graph Theory

Dr P. Allen, LSE

This course provides an introduction to the language, methods and terminology of graph theory and discusses major results with emphasis on various fruitful approaches to modern graph theory.

Dynamical Systems

Prof F. Vivaldi, QMUL

This course reviews some basic concepts of dynamical systems theory, such as stability and bifurcations, chaos and complex dynamics in discrete-time maps, and computational techniques for nonlinear systems.

Representation Theory

Dr M. Fayers, QMUL

This course provides an introduction to results from classical and modern representation theory for finite dimensional algebras.

Measure-theoretic Probability

Prof 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.

LTCC lectures take place at De Morgan House unless otherwise stated. Located at 57-58 Russell Square, De Morgan House is within walking distance of Euston, Russell Square, Holborn and Euston Square tube stations. Further information, full text syllabi, the registration form and timetable are available online at www.ltcc.ac.uk or contact us at office@ltcc.ac.uk.