

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 Statistical Science, 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
- Department of Economics, Mathematics and Statistics, Birkbeck

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**

**Phone: 020 7679 4309
E-mail: office@ltcc.ac.uk
www.ltcc.ac.uk**

**Advanced
courses
2019-2020**

**for PhD students in the
mathematical sciences**

LTCC

London Taught Course Centre

London Taught Course Centre

Advanced Courses 2019–2020

7 October - 4 November 2019

Advanced Computational Methods in Statistics

Dr N. Kantas, Imperial

This course will provide an overview of Monte Carlo methods when used for problems in Statistics. After an introduction to simulation, its purpose and challenges, we will cover in more detail Importance Sampling, Markov Chain Monte Carlo and Sequential Monte Carlo. Whilst the main focus will be on the methodology and its relevance to applications, we will often mention relevant theoretical results and their importance for problems in practice.

(This course will take place at Imperial.)

Introduction to Geometric Analysis on Manifolds

Prof O. Munteanu, University of Connecticut, USA

This course is an introduction to linear partial differential equations on complete noncompact manifolds. It covers several foundational results about the Laplace and heat equations, and their applications to geometry and topology. The basic methods studied in this course are also useful in dealing with many nonlinear differential equations that arise in geometry.

11 November - 9 December 2019

The Mathematical Theory of Compressible Viscous Flow

Dr E. Zatorska, UCL

This lecture series will present the mathematical theory of viscous, compressible, barotropic fluids. The course is divided into two parts: classical Navier-Stokes equations and degenerate systems like shallow water equations.

Examples of Moduli Spaces in Algebraic Geometry

Prof N. Shepherd-Barron, KCL

The aim is to introduce various ideas from the theory of reductive groups and the geometry of algebraic surfaces and show how they interact to describe various phenomena of moduli spaces.

Cohomology of Groups

Prof B. Nucinkis, RHUL

Group cohomology is an area of mathematics relying on a rich interaction between algebra and topology. In this course we will introduce some important concepts in group cohomology using both algebraic and topological methods.

13 January - 10 February 2020

Values of L-functions

Dr L. Garcia, UCL

The course will give an overview of classical and recent results on values of L-functions and their relations with number theory. We will start by discussing the analytic class number formula and congruences between special values and then move on to consider modern, mostly conjectural, generalisations.

Mathematical Topics in General Relativity

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.

17 February - 16 March 2020

Asymptotic Methods and Statistical Applications

Dr H. Battey, Imperial

Many problems in statistics do not possess an exact analytic solution. While numerical evaluation is possible, greater insight is obtained through approximate analytic solutions. These, for instance, allow one to quantify the performance of statistical procedures in terms of intrinsic features or key tuning parameters.

Introduction to the Modern Theory of Scattering

Dr J. Galkowski, UCL

This course will give an introduction to the modern theory of scattering and serve as an application of PDE and functional analysis methods.

Orthogonal Polynomials and Special Functions

Dr A. Loureiro, Kent

This course will offer an overview of the modern theory of orthogonal polynomials and special functions, whilst discussing a vast plank of examples where they became instrumental.

Topics in the Design of Experiments

Dr S. Coad, QMUL

This course covers some of the topics which are essential background for much of the current research in design of experiments. It is in two parts: optimal design theory and sequential design.

Riemannian Holonomy Groups

Dr L. Foscolo, UCL

The course will be an introduction to the geometry of manifolds with special holonomy. After an introduction to holonomy and Berger's list of Riemannian holonomy groups, we will concentrate on the Ricci-flat holonomy groups, i.e. Calabi-Yau, hyperkähler, G2 and Spin(7) manifolds. The second part of the course will focus on constructions of complete non-compact and compact Ricci-flat manifolds with special and exceptional holonomy.

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.

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