

“Pure” Mathematics Courses at LTCC

- Objective: to provide a broad spread of modules of interest to specialists and non-specialists alike. The only prerequisite is “mathematical maturity”.
- Student backgrounds vary: what is “basic” to one student will be “advanced” to another. Moreover we can’t hope to cover everything.
- In research it is a huge advantage to have a wide knowledge to draw on - one can never predict when a technique from one area will turn out to be the key to unravelling a problem in an apparently totally different area.
- Our modules are aimed to be “advanced introductions” - so that students can become aware of techniques and results, both classical and on the cutting edge of current research, and be in a position to read up more if and when they need to.
- We don’t see a sharp distinction between “pure” and “applied”, “probability” and “statistics” - in fact quite the opposite!

“Pure” Modules in 2009-10

Basic courses

C^* -Algebras (Prof C.H.Chu, QMUL)

Finite Simple Groups (Prof R.A.Wilson, QMUL)

Algebraic Topology (Dr L.Hodgkin, KCL)

Graph Theory (Prof G.Brightwell and Prof J.van den Heuvel, LSE)

p -adic Numbers (Dr M.Breuning, KCL)

and in 2008-9

Measure and Category (Prof M.Csornyei, UCL)

Algebraic Number Theory (Dr M.Breuning, KCL)

Advanced courses

Model Theory (Dr I.Tomasic, QMUL)

Invariant Theory of Finite Groups (Dr R.J.Shank and Prof P.Fleischmann, Kent)

Syzygies and Homological Algebra (Prof F.E.A.Johnson, UCL)

The Probabilistic Method (Dr J.Talbot, UCL)

Spectral Theory (Prof L.Parnowski, UCL)

and in 2008-9

Cryptography and Mathematics (Prof N.Biggs, LSE)

Representation Theory (Dr A.Cox, City)

Modular Group and Automorphic Forms (Dr W.Harvey, KCL)

Non-Commutative Geometry (Prof S.Majid, QMUL)

Random Matrix Theory (Dr I.Smolyarenko, Brunel)

and 2-day intensive courses on “hot topics”:

see ltcc website for lists of 2007-8 and 2008-9 intensive courses (and soon for the 2009-10 list).

Overview of “Pure” Mathematics Research at LTCC Institutions

Main research groups (a far from complete description)

Brunel

Combinatorics (4 staff) - graph theory, matroid theory, orthogonal polynomials

Mathematical Physics (5 staff) - random matrix theory, integrable models, asymptotic analysis

City

Algebraic Representation Theory (4 staff) - algebraic and quantum groups; Weyl groups and Hecke algebras; diagram algebras and connections with statistical mechanics

KCL

Analysis (5 staff) - interests centre around the many manifestations of operator theory and particularly spectral theory, from scattering theory to spectral zeta functions

Geometry (5 staff) - minimal surfaces, homogeneous spaces, algebraic groups and flag varieties, quantum groups, symplectic manifolds, complex manifolds, hyperbolic geometry

Number theory (5 staff) - L -functions and zeta functions (real and p -adic); interests centre on the Langlands programme, which links objects from number theory and representation theory via their associated L -functions

Kent

Pure maths (8 staff) - applied analysis and differential equations, quantum groups, representation and invariant theory, computational algebra, discrete mathematics and functional analysis

LSE

Game Theory (4 staff) - game theory, chaos theory, economics of information, matroids, algorithms in linear programming.

Discrete Mathematics and Algorithms (7 staff) - probability theory, graph theory, mathematical aspect of networks, combinatorial and discrete geometry, algorithms and theory of computation

Financial Mathematics and Control Theory (5 staff) - stochastic calculus and financial mathematics...

QMUL

Pure maths (18 staff)

Algebra - group theory (finite simple groups, linear and algebraic groups, topological and combinatorial aspects of group theory, computational group theory, representation theory, quantum groups)

Combinatorics - finite geometries and designs, permutation groups, graph theory, logic, information and coding theory, design of experiments

Analysis - harmonic analysis, functional analysis, operator algebras, non-commutative geometry

Dynamical systems - algebraic dynamics, bifurcation theory, complex maps, ergodic theory, random matrix theory ...

UCL

Analysis (including geometry) (17 staff) - analysis in all its aspects, from functional analysis and partial differential equations to complex analysis, geometric analysis, geometric measure theory, and convexity.

Number Theory (7 staff) - interests range from L-functions and zeta functions to Hausdorff dimension and cohomology of arithmetic groups

Combinatorics (4 staff) - extremal combinatorics, graph theory, connections between combinatorics and statistical mechanics.

(Imperial)

Geometry (5 staff), **Algebra** (3 staff), **Analysis** (6 staff), **Number theory** (3 staff)

Life as a Maths or Stats PhD student in the London Region

- weekly inter-institutional research seminars in many subject areas: algebra, analysis, combinatorics, geometry and topology, number theory,....
- regular “colloquia” of general interest in different institutions;
- libraries and bookshops;
- national meetings (Royal Society, LMS, RSS, RAS, IoP, ...);
- cultural life of the capital;
- transport links to the rest of the UK and Europe (snow permitting!).