

## LTCC Proposed Course

**Title: Representation theory of p-adic groups**

### **Basic Details:**

- Core Audience (1<sup>st</sup>yr or 2<sup>nd</sup>/3<sup>rd</sup>yr: pure, app. or stats): 1<sup>st</sup> year pure
- Course Format (**Extended**: 5 x 2hr lectures or **Intensive**: 2 x 4hr lectures over 2 consecutive days): Extended

### **Course Description:**

- Keywords: Smooth representations, local fields
- Syllabus:
  1. Introduction/recap on local fields, p-adic groups
  2. Smooth representations: definitions and basic properties
  3. Parabolic induction, Jacquet modules, Frobenius reciprocity
  4. Unramified principal series representations, the spherical Hecke algebra and the Satake isomorphism.
  5. Further topics/more examples (possibly including: construction of cuspidal representations, cohomology of Drinfeld upper half-space)
- Recommended reading:  
Introductory level:
  1. Savin, notes on “Representations of p-adic Groups”  
[www.ims.nus.edu.sg/Programs/liegroups/files/sing.pdf](http://www.ims.nus.edu.sg/Programs/liegroups/files/sing.pdf)  
More detailed references:
  2. Cartier, “Representations of p-adic groups: a survey.” In AMS Proceedings of Symposia in Pure Mathematics, vol. 33 pt. 1
  3. Casselman “Introduction to the theory of admissible representations of p-adic reductive groups” [www.math.ubc.ca/~cass/research/pdf/p-adic-book.pdf](http://www.math.ubc.ca/~cass/research/pdf/p-adic-book.pdf)
- Additional Optional reading:  
For context in the theory of automorphic forms:
  1. Bump, “Automorphic Forms and Representations”
  2. Goldfeld & Hundley, “Automorphic Representations and L-functions for the General Linear Group”
- Prerequisites: representation theory of finite groups, would be good if you have seen the p-adic numbers before, I may use a little bit of Lie theory (root systems etc.) in places.

### **Format:**

- No of discussion/problem sheets (typically 4 for extended courses, and 1 for intensive courses, with solutions): 4
- Electronic lecture notes (these are strongly encouraged, as they will form the core of the individual study of the students): Yes
- Necessary support facilities: n/a
- Necessary software requirements for computing facilities: n/a

- Proposed timing: 5 sessions, 2 hours each
- Lecture/computer session/tutorial/discussion split (hours of each): Lectures

**Lecturer Details:**

- Lecturer: James Newton
- Lecturer home institution: King's College London
- Lecturer e-mail: [j.newton@kcl.ac.uk](mailto:j.newton@kcl.ac.uk)
- Lecturer telephone number: 02078480071