LTCC Basic Pure Course

- Title: **Potential Theory**

- Basic Details:

  - Core Audience: Pure
  - Course Format: Basic (10h)

- Course Description:

  - Potential theory has its roots in Newtonian Physics and has grown into a diverse part of analysis with rich applications. It is broadly concerned with the study of harmonic funcions, that is, the solutions of Laplace's equation. This is a course designed to give a flavour of potential theory and some of its applications in approximation theory and complex dynamics, focussing on the simple but illustrative two-dimensional case.

  - Keywords: harmonic functions, subharmonic functions, potentials, polar sets, Dirichlet problem, Green's function, capacity, transfinite diameter

  - Syllabus:

    1. Harmonic functions: basic properties, maximum principle, mean-value property, positive harmonic functions, Harnack's Theorem
    2. Subharmonic functions: maximum principle, local integrability
    3. Potentials, polar sets, equilibrium measures
    4. Dirichlet problem, harmonic measure, Green's function
    5. Capacity, transfinite diameter, Bernstein-Walsh Theorem

  - Recommended reading:

    - T. Ransford, *Potential Theory in the Complex Plane*, Cambridge University Press, Cambridge, 1995

  - Additional/Optional reading:

    - S. Axler, P. Bourdon and W. Ramey, *Harmonic Function Theory*, Springer, New York, 2001
    - D.H. Armitage and S.J. Gardiner, *Classical Potential Theory*, Springer, London, 2001

  - Prerequisites: basic real and complex analysis; rudiments of measure theory are desirable, but not essential and can be provided during the course if necessary

- Format:

  - No of discussion/problem sheets: 4
  - Electronic lecture notes will be available on the course web-site
  - Necessary support facilities: blackboard, OHP, data projector
  - Necessary software requirements for computing facilities: none
  - Proposed timing: late spring 2011
  - Lecture/computer session/tutorial/discussion split: formally 10/0/0/0, but time will be set aside in each 2-hour slot to allow for discussions in class if necessary

- Lecturer Details:

  - Lecturer: Oscar Bandtlow
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