London Consortium Seminar Series on
Mathematics for the Humanities and Cultural Studies

Convener: Burhanuddin Baki (MPhil student)

Of late, there has been emerging what appears to be the beginning of a new 'mathematical turn' in critical philosophy and cultural studies. In this burgeoning trend, more advanced concepts and contemporary results from pure mathematics are introduced in order to help think through various issues and problems in the humanities today. This turn is evident in, among others, Alain Badiou's philosophical *expliques* of set theory and algebraic geometry; the recent interpretations of Gilles Deleuze's work by Manuel de Landa and Brian Massumi; and the various contemporary investigations into the more algorithmic, computational and topological aspects of internet culture and the new media. In order to partake more meaningfully in this new turn, some acquaintance with advanced mathematical concepts might be useful, and some active discussions aimed at trying to provide a critical and cultural investigation of these concepts should be conducted – which is what this seminar attempts to offer. Each weekly session, which will be roughly 90-120 minutes in length, will consist of two halves.

In the first half, a brief presentation will be provided – by the seminar convener or a guest lecturer – where the basic 'story' concerning the mathematical topic in question is explicated (and with the minimum use of equations, without delving too much in the technicalities). The focus for this term will be on the fields often collected under the heading 'discrete mathematics'. The motivation will be less on learning the complete details of a particular theory and more on providing a general overview of several keys areas and high-level results: the narratives, concepts, theorems, proofs and conjectures. Opportunities for questions and queries will be given throughout the presentation. There will be no assigned readings, and there are no prerequisites save for some minimal familiarity with mathematics at the high school level. The second half will devoted towards discussion, where the participants will try to interpret the mathematical results under the guiding concern of relating them to various issues in the humanities that might arise.

Session 1: Set Theory
Tuesday 23 February, 2pm – 4pm: Room MAL 252, Malet Street
Sets, set operations, subsets, power sets and the empty set; Axiomatics and the Hilbert program; Zermelo-Frankel axioms; Godel's Incompleteness theorems and Turing's Halting problem; Set cardinality; The Continuum Hypothesis

Session 2: Mathematical Proof
Tuesday 2 March, 2pm – 4pm: Room MAL 631, Malet Street
Visual proof; Basic logic; Direct proof; Proof by contradiction; Induction; Some other "proofs from the book"

Session 3: The Mathematics of Networks
Thursday 11 March, 2pm – 4pm: Room 101, 30 Russell Square
Graphs, paths and connectivity; Trees; Eulerian and Hamiltonian paths; Planar graphs; Graph colourings and the Five-color theorem; Ramsey's theorem

Session 4: Number Theory
Tuesday 16 March, 2pm – 4pm: Room MAL 151, Malet Street
Natural numbers, negative numbers, integers, and rational numbers; Irrational, real, transcendental and imaginary numbers; Pi and e; Divisibility and prime numbers; Diophantine equations and Fermat's last theorem; Integer Partitions

Session 5: Combinations, Counting and Probability Theory
Tuesday 23 March, 2pm – 4pm: Room MAL 351, Malet Street
Factorials and the binomial coefficients; Principle of counting and the Twelvefold way; Catalan Numbers and the Fibonacci series; Computational Complexity theory and the P=NP problem; Introduction to Probability theory; Conditional Probability and random variables

Suggested Readings

Aigner, M. & G. Ziegler. (2004). *Proofs from the book.* Springer.
Cameron, P.J. (1994). *Combinatorics: topics, techniques, algorithms.* Cambridge U. Press.
Chaitin, G.J. (2007). *Meta maths: the quest for omega.* Atlantic Books.
Davenport, H. (1999). *The higher arithmetic: an introduction to the theory of numbers.* Cambridge U. Press.
Derbyshire, J. (2003). *Prime Obsession: Bernhard Riemann and the Greatest Unsolved Problem in Mathematics.* Joseph Henry Press.
Devlin, K. (2003). *Millennium Problems: The Seven Greatest Unsolved Mathematical Puzzles Of Our Time.* Basic Books.
Diestel, R. (2000). *Graph theory.* Springer.
Doxiadis, A., C. Papadimitriou & A. Papadatos. (2009). *Logicomix: An Epic Search for Truth.* Bloomsbury Publishing PLC.
Du Sautoy, M. (2004). *The Music of the Primes.* Perennial.
Dunham, W. (1991). *Journey through Genius: Great Theorems of Mathematics.* Penguin Books.
Gowers, Timothy. (2002). *Mathematics: a very short introduction.* Oxford U. Press.
Gowers, Timothy. Ed. (2008). *Princeton Companion to Mathematics*. Princeton U. Press.
Hardy, G.H. (1993) *A Mathematician's Apology.* Cambridge U. Press.
Rosen, K.H. (1988). *Discrete mathematics and its applications.* Random House.
Rota, G-P. (1997). *Indiscrete thoughts*. Birkhäuser.
Singh, S. (1997). *Fermat's last theorem.* Fourth Estate.
Snow, C.P. (1993). *The Two Cultures.* Cambridge U. Press.
Sokal, A. & J. Bricmont (1999). *Fashionable nonsense: postmodern intellectuals' abuse of science.* Picador.
Sokal, A. (2000). *The Sokal hoax: the sham that shook the academy.* U. of Nebraska Press.
Stewart, I. (2009). *Taming The Infinite.* Quercus.
Van Lint, J.H. & R.M. Wilson (2001). *A course in combinatorics.* Cambridge U. Press.
Wallace, D.F. (2004). *Everything and More: A Compact History of Infinity.* Norton.
Wells, D.G. (2005). *Prime numbers: the most mysterious figures in math.* John Wiley and Sons.