COURSE DETAIL

MATHEMATICAL ASPECTS OF STATISTICAL MECHANICS

Country United Kingdom - England

Host Institution King's College London

Program(s) King's College London

UCEAP Course Level Upper Division

UCEAP Subject Area(s) Mathematics

UCEAP Course Number 148

UCEAP Course Suffix

UCEAP Official Title MATHEMATICAL ASPECTS OF STATISTICAL MECHANICS

UCEAP Transcript Title MATH/STAT MECHANICS

UCEAP Quarter Units 6.00

UCEAP Semester Units 4.00

Course Description

This course covers basic notions of information theory. Entropy as measure of uncertainty. Constrained optimization with Lagrange multipliers. Maximum entropy inference with constraints. Partition function, free energy as generating function. Collective behavior in spin systems: from independent voters to the tight-knit model (or Curie-Weiss ferromagnet); phase transitions and spontaneous symmetry breaking. Distributions of functions of random variables using Kronecker delta. Laplace's approximation for integrals. Bolzmann distribution and 1d Ising chain: exact calculation for free energy. Variational approximations and trial (factorized) distributions. Time permitting: multi-party voters, stochastic dynamics and Markov Chains, models on social networks, traffic flow and epidemic models.

Language(s) of Instruction

English

Host Institution Course Number 6CCM314A

Host Institution Course Title MATHEMATICAL ASPECTS OF STATISTICAL MECHANICS

Host Institution Campus King's College London

Host Institution Faculty

Host Institution Degree

Host Institution Department

Mathematics

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