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 Course Details
https://www.kcl.ac.uk/abroad/module-options/mathematical-theory-of-collective-b...

Host Institution Campus
King's College London

Host Institution Faculty

Host Institution Degree

Host Institution Department
Mathematics

Course Last Reviewed

2023-2024

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