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

Print