EPFL

MATH-669   **Topics in Mathematical Physics (2018)**

Hongler Clément

Cursus	Sem.	Type
Mathematics		Obl.

Language of teaching	English
Credits	2
Session	
Exam	Oral
Workload	60h
Hours	**28**
Courses	28
Number of positions	

Frequency

Only this year

Remark

Next time: Fall 2018

Summary

Scheme: an intro, a key theorem, and key ideas of the proofs. Topics include: Dimers and Limit shapes, Ising model and Fermions, Conformal Field Theory and Moonshine, KdV and Inverse Scattering, Quantum Information and Measurement, Complex Dynamics and Julia Sets, Spin Glasses and Neural Nets.

Content

Scheme: an intro, a key theorem, and key ideas of the proofs. Topics include: Dimers and Limit shapes, Ising model and Fermions, Conformal Field Theory and Moonshine, KdV and Inverse Scattering, Quantum Information and Measurement, Complex Dynamics and Julia Sets, Spin Glasses and Neural Nets.
The idea is to spend two weeks (4h) on each topic.
Depending on the audience's tastes, other possible topics include: Quantum Computation and Breaking Cryptography, Renormalization Group and Ricci Flow, Gibbs Measures and Phase Transitions, Spin Chains and Anyons, Density Functional Theory and Pseudopotentials, Kinetic Gas Theory and H-Theorem
Lectures on Dimers (Kenyon), Planar Ising Model at Criticality: State of the Art and Perspectives (Chelkak), Conformal Field Theory (Di Francesco, Mathieu, Sénéchal), Statistical Field Theory (Mussardo), Solitons: an Introduction (Drazin, Johnson) Integrable Systems (Hitchin, Segal, Ward), Decoherence (Schlosshauer), Quantum Information Since Democritus (Aaronson), Dynamics in One Complex Variable: Introductory Lectures (Milnor), Complex Dynamics (Carleson, Gamelin) Information, Physics and Computation (Mézard, Montanari)