"On disorder and critical phenomena: lattice free field models at the depinning transition"

With these lectures I will try to give an introduction to ideas developed in physics about the fundamental question of the stability of phase transitions and critical phenomena under the introduction of impurities. In fact, in most of the instances a lot of attention is typically paid to systems of many interacting units (particles, spins, bacteria, agents,) which are identical, or possible of a finite number of types. But a more realistic modeling should include small disordered differences. although this issue is overwhelmingly wide, it is remarkable that some general ideas or heuristics have been developed, and notably the theory initiated by A. B. Harris in the seventies with his work on Ising model with disorders interactions.
The aim of these lectures will be to explain the state of the art in this domain of research restricted to the context of pinning/wetting (Gaussian) interface models. So a preliminary plan of the lectures is:

1.) A crash course on the Lattice Gaussian Free Field.

2.) Pinning potentials, with and without wall repulsion. The (de)localization transition.

3.) On the effect of disorder: the notions of disorder relevance and irrelevance. Some tools and ideas to establish disorder (ir)relevance.