Part 1. Equilibrium physics and chemistry. Fundamentals of information processing ; Quantum physics : a whole new world ; interpreting quantum probabilities ; Bumps along the quantum path : steps, wells and barriers ; Numerical methods and approximations ; Angular momentum and the hydrogen atom ; Atomic and molecular structure ; Solids : from bonds to bands ; Spins and magnetism ; How do spins interact with their surroundings? ; Counting states ; Filling the states : statistical physics

Part 2. Top-down : classical transport. Drift-diffusion ; Physics of mobility : Fermi's Golden Rule ; Physics of recombination-generation ; Engineering barriers : the PN junction diode ; A simple switch : bipolar junction transistor ; Voltage gating : the field effect transistor
Part 3. Bottom-up : quantum transport. Landauer theory for quantum transport ; Quantum transport with scattering ; Non-equilibrium Green's functions for charge ; Non-equilibrium Green's functions (NEGF) for current ; Time-dependent effects