“Office hours”: anytime (Kopietz office 1.104)
Course language: English, but questions may be asked anytime in German
Prerequisites: some knowledge of superconductivity
Schedule: (1 hour 15 min lectures, 9 total)
1. Introduction: overview of concepts, symmetries, materials, and phenomenology
2. Generalized BCS theory
3. Ginzburg Landau theory/Magnetic properties and vortex state
4. Electronic pairing
5. Cuprates
6. Fe-based SC
7. Late-breaking topics (Interface superconductivity, topological SC, …)

Website: http://www.phys.ufl.edu/~pjh/teaching/frankfurt_block_vorlesung2014/


Unconventional Superconductivity

Most of the current excitement in the field of superconductivity is centered on materials which exhibit high critical temperatures Tc. In these systems, the interaction which leads to the phenomenon of Cooper pairing is thought to be essentially electronic in nature, in contrast to the classic electron-phonon superconductors. This leads to a natural tendency for pairs to condense in a state of higher orbital angular momentum, e.g. p,d,…, thereby breaking the point group symmetry of the normal state for T>Tc. I will review the theory of superconductivity briefly, generalize it to unconventional states, and discuss the properties of several classes of materials in their superconducting state, including cuprates, Fe-based superconductors, and heavy fermion systems.