Physics 1374, Fall 2015
Course Outline
(approximate, subject to change)
Instructor : S.M. Frolov

No	Topic	Chapters	Date
1	Syllabus, Overview of Solid State Physics	Oxford 1	Sept 1
2	Background in quantum mechanics and statistical mechanics	Oxford 5-7	Sept 3
3	Heat capacity of solids, Einstein and Debye Models of Solids	Oxford 2	Sept 8
4	Drude and Sommerfeld theory of metals	Oxford 3,4	Sept 10
5	One-dimensional models for vibrations in solids	Oxford 8-10	Sept 15
6	Electrons in solids : a tight-binding one dimensional model	Oxford 11	Sept 17
7	Crystal structure of solids, real space	Oxford 12	Sept 22
8	Reciprocal Space, Brillouin zone	Oxford 13	Sept 24
9	Scattering Experiments (Neutron and X-ray diffraction)	Oxford 14	Sept 29
10	Bloch's theorem, Nearly free electron model	Oxford 15	Oct 1
11	Band structure of electrons in solids	Oxford 16	Oct 6
12	Physics of Metals, Insulators, Semiconductors	Oxford 16-17	Oct 8
13	Low-dimensional systems : graphene and carbon nanotubes	Handout	Oct 13
14	Semiconductor devices (diode, transistor, solar cell)	Oxford 18	Oct 15
15	Paramgnetism and Diamagnetism	Oxford 19	Oct 22
16	Ferromagnetism, Giant Magnetoresistance, Magnetic resonance	Oxford 20-21, Kittel 13	Oct 27
17	Models of Magnetism with Interactions	Oxford 22-23	Oct 29
18	Catch up and Review for Midterm		Nov 3
19	**MIDTERM EXAM**		**Nov 5**
20	Superconductivity : main experiments	Kittel 10	Nov 10
21	Superconductivity : main theories	Kittel 10	Nov 12
22	Superconductivity : devices	Kittel 10	Nov 17
23	Quantum confinement, 2DEGs, quantum Hall effects	Kittel 17	Nov 19
24	Quantum devices (quantum point contact, quantum dot)	Kittel 18	Nov 24
25	Quantum computing principles	Handout	Dec 1
26	Solid state quantum computing implementations	Slides	Dec 3
27	Modern solid state physics topics (e.g. topological states)	Slides	Dec 8
28	**FINAL PROJECT PRESENTATIONS**		**Dec 10**

Note : Chapters given in the Oxford textbook can often be found in Kittel as well