Lecture 1 Crystal structure
1.1 Lattice with Basis
1.2 Classification of Bravais lattice and crystal structures
1.3 Miller indices
1.4 Reciprocal Lattice
1.5 Crystallographic computations
1.6 Symmetry in crystallography

Lecture 2 X-ray diffraction
2.1 Principles
2.2 Determination of the crystal structure by x-ray diffraction
2.3 Precise determination of the Lattice constant by x-ray diffraction
2.4 Powder method, rocking curve, glazing angle diffraction, $\phi$-scan and pole figure
2.5 Phase and crystal structure determination by x-ray diffraction

Lecture 3 transmission electron microscopy (TEM)
3.1 Principles of TEM
3.2 Electron diffraction patterns
3.3 High-resolution TEM
3.4 Determination of the crystal structure by TEM
3.5 Determination of the Lattice constant by TEM

Lecture 4: Surface analysis
4.1 X-ray photoemission spectroscopy
4.2 Auger electron spectroscopy
4.3 Secondary ion mass spectroscopy
4.4 Rutherford backscattering
4.5 Surface analysis (LEED)
4.6 Surface analysis (RHEED)

Midterm 30% Homework 30% Final 40%