Lectures: Basic plasma physics
Material: Lecture notes Ch. 1-7, appendices A,B
Additional material:
- exercises 1..6, midterm exams of 2008 and 2009 and solutions
- derivation sound waves in ideal gas

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Lecture: Energy from Controlled Fusion
Material: Lecture slides, exercises
Additional material: Article by Rebhan and van Oost on burn criteria (only intended as extra information next to the slides)

Main topics: Energy and particle confinement time, Lawson criterion & triple product,
Influence B-field via β, Principles of inertial and magnetic confinement,
Main set-up of the Tokamak, Role of the Lithium blanket,
Exhaust of Helium via the scrape-off layer and divertor,
Thickness scrape-off layer as set by parallel and perpendicular transport
Set-up of the divertor

Lecture: Industrial plasmas and Plasma Surface Interaction
Material: Lecture slides, exercises
Additional material: Lecture notes on plasma chemistry(only intended as extra information next to the slides)

Main topics: Application areas, Classification (gas pressure &plasma density, T_e & T_i)
Advantages plasma over hot gas (T_e & quick response)
Role of the plasma in various applications
(light,radicals,surface bombardment)
Etching (anisotropy, selectivity, synergism, ion bombardment),
Deposition (surface processes, layer growth)
Generation of high-enthalpy flows

Lecture: Plasma diagnostics
Material Lecture slides, exercises
Additional material: Lecture notes on plasma chemistry (only intended as extra information next to the slides, does not cover everything)

Main topics: Physics and principle of each diagnostic covered by the lecture slides

Lectures: Magneto-hydrodynamics
Material: Lecture notes Ch. 7, 10, 12 (skip 12.1.4,12.1.5), 15, 16 (skip 16.3), 17.1, 17.2,
Exercise on magnetic islands, Separate text particle orbits in tokamaks (see website)
Main topics:
- Ohm's law and magnetic reconnection
- MHD equilibrium
- Magnetic confinement in toroidal systems

Lecture: Transport in tokamak plasmas
Material: Lecture slides, exercises
Additional material: Article Hogeweij on degraded confinement (only intended as extra information next to the slides)
Main topics:
Be able to reproduce argumentation/formulas/results on sheets 4, 6-18, 25-27, 33-34, that is
- Transport along/perpendicular to magnetic field lines
- Toroidal geometry
- Classical and neo-classical transport
- Banana orbits
- Turbulence, effect on transport
- Experimental methods (4 approaches)
- Global confinement quantities (sheet 26)
- Local transport coefficients (sheet 27)
- Exp. results (Linear, Saturated, and Improved Ohmic confinement)
- L and H-mode
- Global knowledge (argumentation/formulas/results, main aspects) of sheet 5, 19-24, 28-32, 35, 37-38, 42-45, 52, 59-60

No interrogation on sheets 36, 39-41, 46-51, 53-58

Lecture: Dusty plasmas
Material: Lecture slides, exercises
Additional material: Introductory chapters Thesis V. Land (only intended as extra information next to the slides)
Main Topics:
- Charging of the dust (repelled electrons, ions from trajectory in potential distribution)
- Havnes parameter (what is it, what happens at a large value, compare equilibrium equation on slides 11 and 12)
- Influence of dust on a discharge (more losses, higher temperature)
- Forces exerted by the plasma on a dust particle

Lecture: Astrophysical plasmas
Material: Lecture slides (no exercise)
Additional Material: MHD lecture notes
Main Topics
- Observational aspects of the `solar cycle'
- Explanation of how the solar dynamo operates
- Explanation of why the MHD model is useful to describe the basic force equilibrium in the rather diverse structures of a (laboratory) tokamak, and in solar prominences.
- Space weather and explanation of how MHD models are used to `predict' its effects here on earth.

No interrogation on the slides that were not treated during the lecture.
Last slide is nr. 44

NOTE: selecting examination with a preference "theory" will simply put the emphasis on the theory. You will have to go a bit deeper into the equations, etc. and for instance diagnostics will be handled in less detail.

The preference "experimental" will go deeper into the principles of diagnostics, processes, etc. and the equations will be handled in less detail. Of course equations describing a diagnostic should be known.

The general chapter on energy from fusion is equally important for both preferences.