Introduction to Plasma Physics for Space Applications

Lecturers:

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Practical considerations ...

- The aims of this introductory course are:
  - To provide the students with an understanding of plasma phenomena, with particular insight in space science and aeronautical engineering.
  - To provide the students with the basic concepts of Plasma Physics and a survey of the essential theoretical concepts and methods of Plasma Physics.

- Final objectives:
  - To acquire a basic training in Plasma Physics.
  - To allow the students to follow the arguments of selected papers from research periodicals.

Contents ...

- **Basic concepts** (Dr. L. Conde)
  - Introduction: Ionized gases and plasmas.
  - The ideal Maxwellian plasma. The Plasma parameters. The Plasmas in nature and in the laboratory.
  - The elementary processes and the plasma equilibrium.
  - The physical models for plasmas.
  - The boundaries of plasmas: the plasma sheaths.
  - An eventual additional topic.
- **Advanced topics** (Dr. L.F. Ibáñez)
  - Drifts in space.
  - Landau damping. Waves in plasmas. Nyquist method.
  - Fluid waves in magnetized plasmas.
  - Introduction to magnetohydrodynamics (MHD) and MHD waves.
  - Kinetic and fluid instabilities.

Texbooks and other material ...

- Texbooks, …
  - *Introduction to Plasma Physics and Controlled Fusion*. Vol. I . Plasma Physics. 2nd Edition. F.F. Chen. Plenum Press (1990)
  - *Physique des Plasmas*. Jean-Marcel Rax. Dunod (2005)
  - *Principles of Plasma Physics*. N.A.. Krall and A.W. Trievelpiece. San Francisco Press Inc. (1979).
  - *Introduction to Plasma Physics*. D.A. Gurnett and A. Battacharjee. Cambridge University Press (2006).
- Lecture notes and copies of slides …
  - The last version of my notes (L. Conde) is available at the web page of our group; http://plasmalab.aero.upm.es/
  - Unfortunately, the slides are under development and I will provide you with copies when ready.

… and now the key question ...

- How I will be graded in this course? …
  - Within three weeks the students will be provided with a list of selected papers dealing with different subjects.
  - Each student will read one of them and prepare a 15 minutes presentation.
  - The public exposition of all presentations will take place during the last two lecture days.
  - The two instructors will grade the students according to the,
    - Difficulty and understanding of the scientific content of the selected subject.
    - Quality of her/his presentation.