Module Name

Space Physics

Type of Module	**Module Code**
Basic Module	BM-GEOSPACE

Identification Number	**Workload**	**Credit Points**	**Term**	**Offered Every**	**Start**	**Duration**
MN-GM-GEOSPACE	180 h	6 CP	2. Semester	SuSe	Summer Term Only	1 Semester

1	**Course Types**	**Contact Time**	**Self-study time**	**Intended Group Size**
	a) Lecture	45 h	45 h	30 Students
	b) Exercise	30 h	60 h	

2 Module Objectives and Skills to be Acquired

Understanding the space environment around the earth, other planetary bodies and the solar wind. Understanding basic properties of space plasmas including their mathematical/physical descriptions. The acquired skills are the applications of mathematical/physical tools from statistical mechanics and fluid dynamics as applied to plasmas. Derivations of the plasma descriptions from first principles.

Non-specific skills: Critical assessment of scientific knowledge.

3 Module Content

- Introduction into space plasmas
- Single particle dynamics
- Kinetic theory (Boltzmann and Vlasow equation)
- Derivation of magnetohydrodynamic (MHD) equations
- Properties of MHD fluids
- Waves in plasmas
- Shocks and discontinuities
- Instabilities
- Magnetospheres, solar wind, aurorae

4 Teaching Methods

Lectures and exercises (exercises require attendance)

5 Prerequisites (for the Module)

Formal: None

With regards to the content: Classical mechanics, electro-magnetism, basics of statistical mechanics

6 Type of Examination

Written examination (graded).

7 Credits Awarded

Successful participation in the exercises (50 % of the possible points have to be obtained) and passing of the examination.

8 Compatibility with other Curricula

• Other modules of equal value can be admitted and announced by the examination board after agreement.

• Suitable as an elective course for mathematics, physics and geoscience students

9 Proportion of Final Grade

6/114

10	**Module Coordinator** J. Saur
11	**Further Information** **Required literature:** Baumjohann und Treumann, Basic Space Plasma Physics, Imperial College Press **Additional literature:** Chen, Introduction to Plasma Physics and Controlled Fusion, Plenum Press. Kivelson & Russell, Introduction to Space Physics, Cambridge Univ. Press. Treumann und Baumjohann, Advanced Space Plasma Physics, Imperial College Press.