KTH Electrical Engineering

Course Description 2020
Space Physics II (EF2245), 7.5 hp
Updated 2020-10-26

Course coordinator and lecturer

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Introduction

This course is a continuation of Space Physics I, and will address a similar syllabus, but in more quantitative way with more mathematical detail.

Course goals

After the course you should be able to

- describe and explain basic processes in space plasma physics
- use established theories to estimate quantitatively the behaviour of some of these processes
- make simple analyses of various types of space physics data to compare with the quantitative theoretical predictions
- describe some hot topics of today's space physics research

Litterature

Kivelson, M.G., and C. T. Russel (ed.), Introduction to Space Physics, Cambridge University Press.

Otto, A., Magnetospheric Physics.

Boström, R., Electrodynamics of the Ionosphere, in Cosmical Geophysics, Ed. Egeland et al.

Lyons, L., Formation of Auroral Arcs via Magnetosphere-Ionosphere Coupling, Reviews of Geophysics, 30, 2, 93-112, 1992.

Preliminary schedule

Activity	Date	Time	Subject (preliminary)	Litterature
L1	26/10	10-12	Introduction, Solar wind	KR Ch. 1-2, 4, AO Ch 6.1
L2	2/11	10-12	Solar wind, cont., Shocks	KR Ch. 4, 5, AO Ch. 6.2
L3	3/11	14-16	Shocks, cont., Solar wind interaction with celestial bodies	KR Ch. 6, 8, 15 (p 503-510)
Distribution of Assignment 1	3/11			
T1	6/11	10-12		
L4	9/11	10-12	Ionospheres	KR Ch. 7
L5	10/11	13-15	Ionospheric electrodynamics	RB
T2	13/11	10-12		
Deadline, Assignment 1	16/11	10:00		
Distribution of Assignment 2	16/11			
L6	16/11	10-12	The magnetopause and magnetotail	KR Ch. 9.1-9.3, AO Ch. 8-9
L7	17/11	13-15	The inner magnetosphere	KR Ch. 10, AO Ch. 4-5
T3	20/11	10-12		
L8	23/11	10-12	Magnetospheric dynamics	KR Ch.13
L9	24/11	13-15	Auroral physics	KR Ch. 14, LL
T4	27/11	10-12		
L10	30/11	10-12	Alfvén waves	KR Ch. 11
T5	1/12	13-15		
Deadline, Assignment 2	1/12	13:00		
Distribution of Assignment 3	1/12			
T6	4/12	10-12		
Deadline, Assignment 3	15/12	24:00		
Distribution of examination	11/1	08:00		
Deadline of examination	15/1	24:00		

L = Lecture, T = Tutorial

KR = Kivelson-Russel, LL = L. Lyons, RB = R. Boström, AO = A. Otto.

COVID-19 adjustments

Due to the ongoing pandemic all the teaching this year will be done electronically, via Zoom meetings. Unless otherwise stated we will use the following Zoom meeting rooms for lectures and tutorials:

Lectures and tutorials: https://kth-se.zoom.us/j/4080887604

This will also affect some other parts of the course, e.g. how the examination is handled. COVID-19 adjustments are marked by red in this document.

Examination

The examination will take place in the form of three hand-in assignments during the course, and a home examination at the end of the course. The points earned will be added, and determine the final grade on a scale to be presented during the course. The maximum points for each hand-in assignment is 5 p, and the maximum points for the exam is 60 p, giving a total of 75 p. The grades are then given by

A: 67 - 75
B: 59 - 66
C: 51- 58
D: 43 - 50
E: 35 - 42

The home examination will include a number of individualized problems together with two small, individualized numerical/MATLAB tasks, similar to the hand-in assignments.

Prerequisites

Space Physics (EF2240), and Plasma Physics (EF2200), or equivalent.

Course home page

The CANVAS page will be used for distributing course material and messages.

Course evaluation

The course evaluation will take place via internet after the written exam. You are of course welcome to give your opinion anytime about anything concerning the course, either to me personally, via e-mail or (if you want to remain anonymous) by posting a message in the KTH internal mail letter boxes. Address the message to 'Tomas Karlsson, Space and Plasma Physics, Teknikringen 31'.