



مدونة المناهج السعودية

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الموقع التعليمي لجميع المراحل الدراسية

في المملكة العربية السعودية

مختصر توصيف المقرر

(Course Information)

معلومات المقرر *

اسم المقرر:	فيزياء البلازما
رقم المقرر:	فيز 4562
اسم ورقم المتطلب السابق:	فيز 3222
اسم ورقم المتطلب المرافق:	--
مستوى المقرر:	السابع
الساعات المعتمدة:	3 (0+0+3)
Module Title:	Plasma Physics
Module ID:	PHYS 4562
Prerequisite (Co-requisite) :	PHYS 3222
Co-requisite :	--
Course Level:	Seventh
Credit Hours:	3 (3+0+0)

Module Description

وصف المقرر :

Introduction (Definition of Plasma, Processing Plasmas, Plasma Physics and Plasma Chemistry). Single Particle Motions (Orbits in direct current electric and magnetic fields, Collisions, Transport Phenomena, Chemical Reactions in Plasmas). Plasma Statistical Mechanics (Ensemble Theory, Liouville's Theorem, Particle Distribution Functions, the Boltzmann and Vlasov Equations). Plasma Magnetohydrodynamics (MHD Equilibrium, Magnetic Confinement, Stability). Waves in Cold Plasmas (Wave Equations, Dispersion Functions, The effects of Magnetic Fields). Waves in Hot Plasmas (Acoustic and Magnetoacoustic waves, Landau Damping, Nonlinear Waves). Kinetic Theory and Radiation (Cyclotron emission, Bremsstrahlung). Applications (Fusion, Plasma-Aided Manufacturing).
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Module Aims

أهداف المقرر :

1	Understand disturbances in the near-Earth space environment
2	To apply fluid theory to large scale plasmas
3	Understand the complementary nature of kinetic and fluid plasma descriptions
4	Understand Earth's space environment in relation to that of other planets
5	Have an introduction to current key research

Learning Outcomes:

مخرجات التعليم:

1	The knowledge of the basic concepts of plasma physics
2	The ability to understand the relationships and linked to natural laws of creation
3	To distinguish between the different states of the materials.

Course Contents:**محتوى المقرر:**

ساعات التدريس (Hours)	عدد الأسابيع (Weeks)	قائمة الموضوعات (Subjects)
6	2-1	Overview: the solar atmosphere, solar wind and interactions with planetary bodies
6	4-3	The fluid theory of plasmas, frozen-in theorem (use example of Parker spiral of interplanetary magnetic field)
6	6-5	The shape of the Earth's magnetosphere: the balance of thermal, dynamic and magnetic pressures
6	8-7	Magnetic reconnection and how it dominates energy flow in the magnetosphere
3	9	Convection and substorm phenomena
3	10	Coronal mass ejections and geomagnetic storms
3	11	Ionosphere and plasmasphere
3	12	Aurora
6	14-13	Trapped particles, ring current and radiation belts
6	16-15	Effects of terrestrial disturbance: satellite health and safety, satellite orbit prediction, disruption to communication, navigation, radar systems and power distribution networks
3	17	Applications in fusion research and astrophysics

Textbook and References:**المقرر والمراجع المساندة:**

سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم الكتاب المقرر Textbook title
(2006) ASIN: B000YIVZ7U	Springer	F. F. Chen	Introduction to Plasma Physics and Controlled Fusion
سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم المرجع Reference
(2005) ISBN:0521367301	Cambridge University Press	D. A. Gurnett and A. Bhattacharjee	Introduction to Plasma Physics: with Space and Laboratory Applications