Course Specifications

Programme(s) on which the course is given: Physics, Physics & Laser, Physics and computer science, and Physics & chemistry.

Major or Minor element of programs: major, major, minor, major.

Department offering the program: Physics

Department offering the course: Physics

Academic year / Level: 4

Date of specification approval: 2012

A- Basic Information

Title: Plasma Physics **Code: P4710**

Credit Hours: 2 h **Lecture: 2h**

Tutorial: 00 Practical: 00 Total: 2h

B- Professional Information

1 – Overall Aims of Course:

By the end of the course, the student should be able to understand the general concepts used in plasma physics and different types of plasmas (i.e. laboratory and naturally occurring plasmas) .

Also, the aim of the course is to provide a broader idea about the differences between plasma and ordinary gas, and to through some light on the criterion for a gas to be called a plasma.

In addition, the student should be able to understand the different methods used to confine a high temperature unstable plasma. The general remarks about complete thermodynamic equilibrium (CTE), and local thermodynamic equilibrium (LTE) plasmas should also be addressed.

Many practical examples relevant to the design and application of plasma will be included.

2 – Intended Learning Outcomes of Course (ILOs)

a) Knowledge and Understanding:

The student should be able to:

a.1- Know the difference between laboratory and naturally plasmas.

a.2- Understand the difference between plasma and ordinary gas.

a.3- Understand and interpret the general plasma characters, production and confinement.

b- Intellectual Skills

The student should be able to:

b.1- Analysis of plasma application systems.

b.2- Classify equilibrium and non-equilibrium plasmas.

b.3- Identify the points of valuable strength in plasma applications.

c- Professional and Practical Skills

The student should be able to:

c.1- Solve problems of varying difficulty using suitable mathematical rules.

c.2- Describe the production and operation of plasma.

c.3- Design and perform experiments in laboratory.

c.4- Differentiate between different types of plasmas.

d- General and Transferable Skills

d.1- Using computer and internet

d.2- Work in team and make discussions

d.3- Enhance writing ability of assigned reports

d.4- Work in groups and enhance oral communications

3- Contents

Topic	No. of hours	Lectures	Tutorial/Practical
Introduction and definition of plasma. - **Definition of plasma** - **Occurrence of plasma in nature**	**2** **2** **2**	**4**	**0**

and in laboratory - Debye shielding and concept of temperature - Plasma parameters and criteria of plasmas	2		
Single particle model of plasma - Motion of charged particle in uniform and non-uniform and magnetic fields - Magnetic mirrors - Plasma as a fluid	2 2 2	3	0
Plasma stability - The plasma stability and plasma equilibrium - Types of instabilities - Plasma confinement	2 2 2	3	0
Application of plasma physic - Energy conversion - MHD generator - Plasma and fusion reactors	2 2 4	4	0

4– Teaching and Learning Methods

4.1- Lectures using data show (if available)

4.2- Using white board

4.3- Reports

5- Student Assessment Methods

5.1 Oral to assess understanding

5.2 Written exams to assess investigation, and derivations.

5.3 Report to assess scientific review.

5.4- Sheet exam-week 8&14 (mid &final exam)

Assessment Schedule

Assessment 1: Mid-term and final axam (7th and 14th week)

Assessment 3: Oral exams- every week

Assessment 4: Research report exam- last week

Weighting of Assessments

Mid-Term Examination	**20 %**
Final-term Examination	**60 %**
Oral Examination.	**10 %**
Semester Work	**10 %**
Total	**100 %**

6- List of References

6.1- Introduction to plasma physics, by Francis F. Chen

6.2- An introduction to plasma physics, by W. B. Thompson

7- Facilities Required for Teaching and Learning

Advanced data show, Good screen, Comfortable disks for students

Course Coordinator: Dr. Abdul Aziz Habib

Head of Department: Prof. Dr. Sanaa Maiz

Date: / /