科目ナンバリング	U-LAS12 20019 LE57						
授業科目名 <英訳>	Introduction to Plasma Science-E2 Introduction to Plasma Science-E2			担当者所属 職名・氏名	工学研究科　講師　Arseniy Aleksandrovich, Kuzmin		
群	自然科学科目群		分野(分類)	物理学(発展)		使用言語	英語
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2026・後期	曜時限	火3	配当学年	主として1回生	対象学生	全学向

[授業の概要・目的]

Plasma is diverse and very abundant. Almost 99% of the visible matter in the observable Universe is in the state of plasma. It is everywhere in Space and on Earth, naturally occurring and produced in laboratories or used in factories. Stars, nebulas, Auroras, sparks, arc welding, thermonuclear reactors - this is just a beginning of a big list of various plasmas.

In this course the so-called fourth state of matter - plasma, will be introduced. We will start with a brief overview of possible plasmas and will define it. Next, we'll go into some details about plasma description. There are various approaches to describe plasma, they depend on the plasma kind. We will mainly focus on a single particle approach. If you are not familiar with some mathematics or physics, I will introduce the necessary concepts in class. So any humanities students are welcome.

After we finish with a more formal descriptions, we will review some of the cosmic plasmas: our Sun, solar wind, and Auroras.

Then I will introduce some of technological plasma applications and will focus on explanation of a magnetic confinement of plasma for energy generation.

[到達目標]

The goal of this course is to introduce listeners to the "forth state of matter" - plasma.
To understand what is plasma and what are its properties.
To learn the role of plasma in the cosmic phenomena.
To learn about scientific and technological applications of plasma.
To understand basic idea of the fusion energy research.

[授業計画と内容]

1. Kinds of plasma, definitions of plasma.
2. Gas discharges: we'll follow an electron and discover the fundamentals of ionization, excitation, and other phenomena important in gas discharges and more.
3. Laboratory plasma and how to make one: breakdown of gases.
4. Laboratory plasma: glow, arc and corona discharges.
5. Technological applications of plasma.
6. Cosmic plasma: star formation and start structure.
7. From Sun to Earth: solar corona, solar wind, and Aurora.
8.The ultimate energy source on Earth: thermonuclear fusion.

14 lectures in total and one feedback class.
1-2 lessons will be held for each item.

Introduction to Plasma Science-E2(2)へ続く↓↓↓

Introduction to Plasma Science-E2(2)

[履修要件]

At the beginning of the course, you do not need the knowledge of Mathematics and Physics. Some grasp of Mathematics and Physics is important, however, the essential knowledge for the course will be provided as needed in class.

[成績評価の方法・観点]

Evaluation will be based on:
10% attendance and participation
20% homework
20% quiz
50% final exam

[教科書]

授業中に指示する

[参考書等]

（参考書）

John Wesson 『Tokamaks』（Clarendon Pres - Oxford）ISBN:0-198-50922-7
Syun-Ichi Akasofu 『Exploring the secrets of the aurora』（Springer）ISBN: 0-387-45094-7
A. C. Phillips 『The physics of stars』（John Wiley & Sons）ISBN:0-471-94057-5
Markus Aschwanden 『Physics of the solar corona』（Springer）ISBN:3-540-30765-6
Francis F. Chen 『Introduction to Plasma Physics and Controlled Fuion』（Springer）ISBN: 978-3-319-22308-7

[授業外学修（予習・復習）等]

Preparation for lectures will include revision of class materials and homework assignments. Detailed instructions will be given during the class.

[その他（オフィスアワー等）]

[主要授業科目（学部・学科名）]