Course Title: **"Plasma Physics"**
"離子體物理" (PHYS 535)

Teacher: Professor **Tsun-Hsu Chang (張存續)**

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1. **Textbook:** Dwight R. Nicholson, "Introduction to Plasma Theory" Chapters 1, 2, 6, and 7 (supplemented by Special Topic(s)).

2. **Principal References:**
   – Umran S. Inan and Marek Golkowski, "Principles of Plasma Physics for Engineers and Scientists";
   – Krall and Trivelpiece, "Principles of Plasma Physics";
   – E. Kreyszig, "Advanced Engineering Mathematics";
   – J. D. Jackson, "Classical Electrodynamics".

3. **Conduct of Class:** Every Fridays R5R6R7 13:20-16:20, total 180 minutes including 30-minute break @ Physics building R501. The Course is offered in English, but important physical concepts will be reiterated in Chinese. Students have to go through the algebra in the lecture notes before attending classes. Questions are strongly encouraged.

4. Grading Policy: Midterm and final oral presentations (45%×2); Class participation and attendance (10% extra). The overall score will be normalized to reflect an average consistency with other courses.

Week	Date	Content
1	09/16	Mid-Autumn Festival (make-up someday)
2	09/23	Introduction & Chap.1 **Introduction**
3	09/30	Teacher will attend an International Conference (make-up someday)
4	10/07	Chap.1
5	10/14	Chap.2 **Single Particle Motion &** PowerPoint preparation guideline
6	10/21	Chap.2
7	10/28	Chap.6 **Vlasov Equation**
8	11/04	**Oral presentation I**
9	11/11	**Oral presentation II**
10	11/18	Chap.6
11	11/25	Chap.6
12	12/02	Chap.6
13	12/09	Chap.6
14	12/16	Chap.7 **Fluid Equations**
15	12/23	**Oral presentation I**
16	12/30	**Oral presentation II**
17	01/06	Special Topic: Gain and Bandwidth...
18	01/13	Make-up if needed

* This table is for your reference only. The practical schedule depends on the students' learning condition.

5. Lecture Notes:

The first three chapters of the lecture notes come from Nicholson and then follow by two selected topics, all starting from basic equations.

As in Nicholson, we adopt the Gaussian unit system. The conversion between different unit system can be found in Jackson.

Equations numbered in the format of (1.1), (1.2)... refer to Nicholson. Supplementary equations derived in lecture notes, which will later be referenced, are numbered (1), (2)... [restarting from (1) in each chapter.] Equations in Appendices A, B…of each chapter are numbered (A.1), (A.2)…and (B.1), (B.2)…

Page numbers cited in the text (e.g. p. 120) refer to Nicholson.

Section numbers (e.g. Sec. 1.1) refer to Nicholson. Main topics within each section are highlighted by **boldfaced** characters. Some words are typed in *italicized* characters for attention. Technical terms which are introduced for the first time are <u>underlined</u>.

Core capabilities to be cultivated by this course :

- 物理相關數學能力（25%）
  Mathematical capability in physics (25%)

- 高階物理知識（25%）
  High level knowledge of physics (25%)

- 自主學習能力（20%）
  Independent learning capability (20%)

- 溝通表達能力（30%）
  Capability of communication and expression (30%)