General Physics I: Administrative Information for 115–1

Course [PHY102E] General Physics I (Mechanics & Oscillatory Motion), Friday 13:10–16:00.

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Office hours Wednesdays 14:00–16:00 and Fridays 16:00–18:00. 理SC 2006–1.

Webpage https://www2.nsysu.edu.tw/iwamoto/gp1.html

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Evaluation Midterm and term exams (mandatory) and performance (optional). With midterm- and term-exam scores A and B (out of 50 each) and performance score C (max 30), the grade is given by $\max[A+B, f(A+B+C)]$, where $f(x) = 0.58x+25$ (half-up rounding). The performance is assessed by Prep Essays, Mini Tests, and classroom performance including attendance with criteria depending on student's grade level and department.

Themes and topics

An introductory course to University Physics. Students are expected to comprehend fundamental concepts in physics but also learn how to study physical science in university individually based on English textbooks.

You think about yourself and **how you can learn physics efficiently** so that you make your NSYSU life more enjoyable and satisfactory. Throughout this semester, you try to build your way of learning, where you need to **learn proactively** by utilizing lectures and books given in English.

This lecture's second goal is to learn **fundamental concepts** in physics, such as energy and force. Toward the goal, you begin with **basic calculus and vector arithmetic**: you learn differentials, essential integrals, and calculations with vectors. Using those tools, you analyze **three-dimensional motions of particles** and **oscillatory motions and waves**.

The tools and concepts you learn are widely used in future lectures, such as General Physics 2, Circuit Theory, Electromagnetism, and Electronics.

Textbook

Serway, Jewett, and Peroomian, *Physics for Scientists and Engineers with Modern Physics*, 11th ed. **Volume 1.** Cengage Learning. (Custom Version, ISBN 9786267533383)

- We will discuss Chapters 1–9 and 15–17 in **Volume 1**.
- However, book suppliers may not allow you to buy Volume 1 only. You may negotiate with suppliers. **In case they do not sell them separately, please let Sho know** and Sho will do the lecture without relying on the book.
- ~~You will use the book in the activities during lecture hours.~~
- ~~Sho strongly recommends[*1] you to bring the physical book (printed version) to the lecture.~~

[*1] Sho treats you as an independent adult and avoids "forcing" you to do anything. When Sho "strongly recommends", Sho expects that you will likely learn with poor efficiency and get poorer exam results if you don't follow the suggestion.

Student's goals

At the end of this course,

- I know how to study at the university. I have “my way of learning” customized for my personality and cognitive characteristics.
- I know how to study efficiently, proactively, and individually based on English textbooks.
- I can perfectly handle quantities with physical units without confusing vectors and scalars.
- I am familiar with differentials, integrals, and vector arithmetic, and can use them to analyze three-dimensional motions.
- I can explain “energy”, “work”, “potential”, “momentum”, and relations among them.
- I can express waves by trigonometric functions and analyze them using calculus techniques.

Schedule

9.11	⟨1⟩ Units. Significant figures. (+ How to Learn)	§1.1, 1.3–1.6
9.18	⟨2⟩ Math. Derivatives. Integrals. (+ How to Attend Lectures)	§B.1–B.7
9.25	National Holiday	
10.02	⟨3⟩ Vectors. 1D-Motion. 2D-Motion. (+ How to Read Textbooks)	§2, §3, §4
10.09	National Holiday	
10.16	⟨4⟩ Force. Newton’s Laws. Frictions.	§5
10.23	⟨5⟩ Circular Motion. Frame. Fictitious Force.	§6
10.30	**Midterm Exam**	
11.06	⟨6⟩ Work and Energy. Conservative Force.	§7
11.13	⟨7⟩ Work and Energy. Energy Conservation.	§7–8
11.20	⟨8⟩ Energy Conservation. Power. Momentum.	§8–9
11.27	⟨9⟩ Impulse. Elastic Collision. Center of Mass.	§9
12.04	⟨10⟩ Oscillatory Motion. Waves.	§15–16
12.11	⟨11⟩ Waves and their Superpositions.	§16–17
12.18	**Term Exam**	
12.25	National Holiday	

(1) Introduction of Lecturer and TA

(2) University Principles

1. **No longer kids**. We are colleagues.
2. Learn by yourself. **You'll never be taught.**
   - I don't teach. I'm not your teacher 老師 but lecturer 講師.
3. Do own duty.
   - I want money, so do researches+lectures. If you want academic credits, get $\geq$ 60 points.
   - "Teach you physics" is not my duty. "Attend lectures" is not your duty.
   - 1 academic credit (學分) = (50 minute lecture + 100 minute self-study) $\times$ 16 weeks.
4. Ask for help. Friends, colleagues, professors, secretaries, TA, ...
   - **Nobody helps you** if you don't ask for help. Everyone will help you if you ask. (In particular, the TA will do nothing for you if you do not ask.)
   - Take care of mental health, money, academic honesty, credit, and colleagues/family.
   - Visit professors anytime. **We will welcome you**, especially during office hours.

(3) Administrative Information on This Course

3.2 Objectives = One-year preparation for 電X學

- EE = Phys + Math+ CS. EE's Physics = Circuit + EM + electronics (電X學).

  電X學 needs Math: vector calculus (**differentials** and **integrals** of **vectors**), ODE.
  Phys: quantities with **units**; concepts such as **energy**, **current**, **voltage**.
- GP1: Differentials, integrals, vectors. Force, energy, oscillation. *How to learn by yourselves.*
- GP2: Electromagnetism etc. (held by another professor).

3.3 Evaluation and Make-up Principles

- Two exams: mandatory, 50 points each.
  - If you have reasons for absence, you must follow *Regulations for Leave Application*[*2]. Otherwise, your grade will be **X**.
- Performance score: Max 30 points. Not mandatory. (Some points may be given at Sho's discretion.)
  - Make-up will be provided for official leaves 公假 or COVID-19 if officially applied.[*3]
  - No make-ups for other health problems. Other reasons are on a case-by-case basis.
- The final make-up 補救 may be granted, but only to students who show continuous effort through regular attendance, submissions of **Prep Essay**, and submissions of **Workbook** at exams (e-notebook not allowed).

Hint: See *NSYSU Guidelines for Evaluation*[*4] for grading system.
For Grade **C**−, get $\geq$ 59.5 points out of 130 [= 50 (midterm) + 50 (term) + 30 (activity)].
If you want **A**−, get $\geq$ 94.0 points out of 130, or get $\geq$ 79.5 out of 100 (two exams).

[*2]學生考試請假及補考辦法 https://oaa.nsysu.edu.tw/var/file/3/1003/img/1296/acade_rule_09.pdf
[*3]https://sis.nsysu.edu.tw/main.php Indigenous peoples' festival holidays are respected.
[*4]學生成績作業要點 https://oaa.nsysu.edu.tw/var/file/3/1003/img/1296/acade_rule_32.pdf

3.4 Textbook + Notebook

Textbook

- **Required. 11th edition, Volume 1.** You are strongly recommended to bring the textbook every week. *However, book suppliers may not allow you to buy Volume 1 only. In that case, Sho will do the lecture without relying on the book, so that you do not have to buy the book.*
- Around NT$1400 for Vol. 1+2. 課代表 should contact 許益凌先生 (TEL:0919–121727) or office (TEL:04–27088787 ext. 216) 賴小姐 for bulk purchase.
  https://www.tsanghai.com.tw/book_detail.php?c=264&no=5298

Three notebook strategy (Sho's recommendation; you can choose your own way.)

① **Lecture Notebook**: Paper *(recommended)* or e-notebook.
  - During lectures, you need to summarize what Sho says/writes on your notebook.[*5]

② **Workbook**: Required; you need to prepare a paper notebook.
  - Used in "activities" during lectures.
  - Used in your self-study at home: solve homework problems and others on this notebook.
  - You may submit it at the exams to show your regular effort. [E-notebooks not accepted.]

③ **Memory Notes** (= words + formulae → the next lecture)

[Hint 1: Sho will not provide lecture notes. Take notes by yourself. Improve note-taking skill.]
[Hint 2: Open both textbook and notebook together in lectures. (→One of them should be in paper.)]

3.5 Lecture = (Mini Test) + Lecture + Activity

Mini Test: 3–4 times in this semester. [Part of Performance Score]

- You cannot use mobiles/tablets/PCs/Internet. You cannot discuss with others.

Activity: Solve problems individually (on **Workbook**).

- You can discuss with others, ask for help, and use any tools.
- Sho may ask you to do a presentation on your answer. [Bonus score for Evaluation]

Lecture rules
(1) We are colleagues, so we create lecture together.
(2) You are adult, so you can do anything except for disturbing me.
Conflicts between students are to be solved by students.

- **You must interrupt Sho** if you have questions/comments.[*6]
- You can drink water/non-alcoholic beverage or eat small candies/gums/chocolates (as long as room-regulation allows).
- In principle, you can use computers, tablets, smartphones, etc. (but not during tests).
  - It will disturb your concentration. It is your own risk.
- Do not eat "foods." Do not drink alcohol. Do not talk over phones.
- **[VOTE]** Should we kick-out students who are talking with others during lectures?

We use Google Classroom for announcements and communication.

[*5] Another idea: write directly in the textbook. Sho actually tried this in his freshman, but it didn't work well, so he switched to the three-notebook strategy. (And of course, you can't do it in lectures without textbooks.)

[*6] You should think this is **your duty** in all university lectures. Our job is not to finish the materials but to help you learn. Furthermore, you can help other students by asking questions! When you have questions, usually others have the same one (and it is Sho's fault). It also helps Sho, because Sho can improve the lecture.

3.6 **Home Study** = Homework + Review + Preview

Homework: ① **Minimal homework** (+ **Prep Essay**) ② Standard tasks ③ Extra tasks.

- Without doing ①, you **will not understand** the lecture content.
- Prep Essay is included from Homework 03. (online; Google Classroom)
  - Submit your answer by **1:00am** of the lecture day. [Part of Performance Score]
  - Your Prep Essay score may get higher if you attend the (previous) lecture.

Preview: **Making Glossary** is critically important in EMI lectures. → next week.

3.7 Your goals

- Get used to university = Learn *how to learn*.
  - Lectures: Preview + Attendance + Review.
  - Self-study: Scheduling. Read the textbook.
  - Help each other: Office hours. Share your note. Share your solution.
- Essential math: differentials, integrals, vectors.
  - Global standard of engineering students: can calculate derivatives of "simple" functions.
- Essential phys:
  - Quantity with unit.
  - Fundamental concepts: force, energy, momentum, ...

3.8 Other Remarks

Scientific remarks

- This course uses the SI unit system.
- The difference between Sho's and Textbook's notation: (You can use either.)
  - Cartesian unit vectors: $\vec{e}_x$, $\vec{e}_y$, $\vec{e}_z$ vs $\hat{\mathbf{i}}$, $\hat{\mathbf{j}}$, $\hat{\mathbf{k}}$
  - elementary charge: $|e|$ vs e $\quad(= 1.602\,176\,634 \times 10^{-19}\ \mathrm{C})$[*7]
- Sho always writes "$\log_{10}$" for base-10 logarithm and *tries to* use "ln" for natural logarithm. Please ask when ambiguous.

Administrative remarks

- Students with disabilities are encouraged to contact Sho immediately as well as *the student affairs office*[*8]. Special considerations are provided based on their advice.
- You are very welcome to visit Sho during the **office hours**, but also in any other time.
- High-quality homework submissions from you might be shared with (but only with) people in this lecture, where your name will be hidden.
- Sho is extraordinarily strict against **plagiarism**.
  - Please read NSYSU's *Guidelines for Students' Academic Ethics and Handling of Cases in Violation of the Academic Ethics*. The guidelines, in particular Article II (3), (4), and (6), are taken into account when Sho evaluates students' reports or exam/quiz answers.[*9]

[*7] This equation is exact after 2019, when the SI unit system was updated. You may find obsolete explanation in old books, such as the 10th edition of the textbook.

[*8] 學務處諮商與健康促進組（特教生服務）https://ccd-osa.nsysu.edu.tw/p/412-1091-24059.php

[*9] An example: Imagine you are writing a report. If you "use" some books or others' reports, you must write so. If you had a discussion with others, you must write so.

(4) Suggestions from Your Seniors

(5) Suggestions from Sho Hint: These are very subjective. No need to follow. Decide by yourself.

General Learning method

- Make a weekly schedule 課表. No teacher to prepare it for you.
- Buy a physical textbook. Prepare a physical notebook.
  - New life-stage; don't change everything at once! E-books are for junior/senior students.
  - You can't jump quickly on e-books. Less effective. Less clever.
  - E-note users may spend too much for "beautiful note". Waste of time. Not wise.
- Learn "how to learn". Improve your learning method. You are going to learn for $\geq$ 50 years.
  - https://www.cmu.edu/student-success/other-resources/fast-facts/succeed-in-physics.pdf
  - https://www.wikihow.com/Learn-Physics
  - https://www2.oberlin.edu/physics/dstyer/StudyTips.html
- Can't focus at home? **Yeah, I cannot, too!!** Go to a library or a study room to focus!
- **Never hesitate to ask questions to others. Ask immediately when you have a question.**

Learning Physics

- **Distinguish vectors from scalars. Never forget units.**
- Discuss with your classmates. It is why you come to university!
- [advanced note] Don't solve problems first. Do it after you understand related concepts.
  - In high school, you could develop your understanding by solving problems. In university, it does not happen because each concept is more abstract and more complicated.

Self study: Problem solving

- Your answer contains only equations? It's bad! You need to **write English sentences** to explain your thoughts. *Process toward the answer is more important than the answer itself.*
  - Sho *does not want to* read your work if equation only (without explanations by text).
- You have no teacher to check your answer. **Check your answers** by yourselves.
  - Sho *does not want to* read your submission if you didn't do double-check.
- Discuss with your classmates. It is why you come to university!

During Lectures

- Bring your paper textbook. Come before 13:08.
- Take note. Develop your note-taking skill, which you will employ for more than 30 years.
- **Never hesitate to ask questions, even if Sho is speaking. Ask right after you find it.**

Work Together

- Share your solutions with others. *Sho will never provide solutions of homework/exam.*
- Visit professors during office hours. (Sho is usually there and bored 閒/無聊 in office hours).
- **Never hesitate to ask questions. Ask anytime, anybody when you have a question.**