

## SUBJECT OUTLINE DETAILS

### 1. Subject: Physics for Scientists and Engineers I (Vật lý 1)

- **Code:** PH183C
- **Credits:** 4
- **Hours:** 48 theory hours, 8 practice hours, 4 project hours, 100 self-study hours

### 2. Management Unit:

- **Department:** Physics...
- **Faculty/School/Institute/Center/Department:** College of Natural Sciences

### 3. Prerequisites: Calculus 1 & 2

### 4. Subject objectives: ...

#### 4.1. Knowledge:

The course offer the basis knowledge of mechanics and heat of gernalal physics, the content of the course can be summarized as follows:

- 4.1.1. Measurement in physics and unit systems
- 4.1.2. Motion
- 4.1.3. Forces and equations of motion
- 4.1.4. Work and mechanical energy
- 4.1.5. Conservative laws
- 4.1.6. Fluids, fluids' characteristics and fluid's equation of motion.
- 4.1.7. Temperature, heat and heat phonomena.
- 4.1.8. The kinetics theory of gasses.
- 4.1.9. Entropy and activity principles of heat machines.

#### 4.2. Skill:

- 4.2.1. Analysis and synthesis skills.
- 4.2.2. Systematization and modeling skills.
- 4.2.3. Computation skill.
- 4.2.4. Application of mathematical knowledge for solving physics problems .
- 4.2.5. Observation skill.
- 4.2.6. Presentation skill.
- 4.2.7. Using informatics skill.
- 4.2.8. Organization skill.

#### 4.2.9. Team work skill.

### 4.3. Attitude:

4.3.1: Honest, accuracy and high responsibility in their work, teamwork cooperation with colleagues and the community.

4.3.2: Demonstration of civic responsibility and ethical attitude; spiritual sense, having the industrial style for working, studying, scientific research and ability to group collaboration.

4.3.3: Thinking method and scientific study, investment and innovation in the field of physics and technical applications for real life.

4.3.4: Ability for cconscious learning and lifelong learning.

### 5. Brief description of subject content:

The course offers the general knowledge of mechanics and heat. The course provides the concepts of coordinates, position, displacement, velocity , and acceleration. The common forms motion such as motion in 1D, 2D, 3D; circular motion , and the free fall. The dynamics section provides the concept of force as well as the types of forces in nature. The concept of momentum, kinetic energy , potential energy and the the conservation laws. The center of mass, the moment of inertia; equation of rotational motion. Fluid mechanics is also present in introductory level. The course also provides the general contents of oscillations and waves, and thermodynamics.

### 6. Subject content structure:

#### 6.1. Theory

	Content	Hours	Objectives
<b>Chapter 1. Kinetics</b>		<b>4</b>	
1.1.	Mearurement and the international system of units		4.1.1, 4.2
1.2.	Vectors and scalars		4.1.2, 4.2
1.3.	Position, displacement, velocity and acceleration		4.1.2 , 4.2
1.4.	Addition of velocity and acceleration		4.1.2, 4.2
1.5.	Motion in two dimensions and three dimensions		4.1.2, 4.2
1.6.	Free falling		4.1.2, 4.2
<b>Chapter 2. Dynamics</b>		<b>5</b>	
2.1.	Newton's first law and force		4.1.2, 4.1.3, 4.2
2.2.	Newton's second law		4.1.2, 4.1.3, 4.2
2.3.	Newton's third law		4.1.2, 4.1.3, 4.2
2.4.	Friction		4.1.2, 4.1.3, 4.2
2.5.	Uniform circular motion		4.1.2, 4.1.3,

2.6. Centripetal force	4.2
2.7. Gravitation	4.1.2, 4.1.3, 4.2
<b>Chapter 3. Work and energy</b>	<b>5</b>
3.1. Work, power	4.1.4, 4.2
3.2. Mechanical Energy	4.1.4, 4.2
3.3. Conservative force	4.1.4, 4.1.5, 4.2
3.4. Linear momentum	4.1.4, 4.1.5, 4.2
3.5. Conservation of momentum an mechanical energy	4.1.4, 4.1.5, 4.2
3.6. Collisions	4.1.2, 4.1.4, 4.1.5, 4.2
3.7. Motion in graviational potential	4.1.2, 4.2
<b>Chapter 4. Rotaional motion</b>	<b>5</b>
4.1. The rotational variables	4.1.2, 4.2
4.2. Torque	4.1.3, 4.2
4.3. Rotational inertia	4.1.3, 4.2
4.4. Rotaional motion equation	4.1.2, 4.2
4.5. Angular momentum and conservation of angular momentum	4.1.3, 4.1.5, 4.2
4.6. Work and rotational kinetic energy	4.1.4, 4.2
<b>Chapter 5. Fluids</b>	<b>5</b>
5.1. Fluids, density and pressure	4.1.6, 4.2
5.2. Fluids at rest	4.1.6, 4.2
5.3. Passcal's principle and pressure measurement	4.1.6, 4.2
6.4. Archimedes' principle	4.1.6, 4.2
5.5. Ideal fluids in motion	4.1.6, 4.2
5.6. The equation of contunity	4.1.6, 4.2
5.7. Bernoulli's equation	4.1.6, 4.2
<b>Chapter 6. Oscillations</b>	<b>4</b>
6.1. Simple harmonic motion	4.1.2, 4.2
6.2. Hook's law for simple harmonic motion	4.1.3, 4.2
6.3. Energy in simple harmonic motion	4.1.4, 4.2
6.4. Pendulums	4.1.3, 4.2
6.5. Simple harmonic motion and uniform circular motion	4.1.3, 4.2
6.6. Damped simple harmonic motion	4.1.2, 4.2
6.7. Forced oscillations and resonance	4.1.2, 4.2
<b>Chapter 7. Waves</b>	<b>5</b>
7.1. Waves and wave observables	4.1.1, 4.1.2, 4.2
7.2. Wave equation	4.1.3, 4.2
7.3. Interference and standing waves	4.1.3, 4.2
7.4. Wave energy	4.1.4, 4.2

7.5. Sound wave and it's characteristic	4.1.2, 4.1.4, 4.2
7.6. Intensity and sound level	4.1.4, 4.2
7.7. The Doppler effect	4.1.3, 4.2
7.8. Supersonic speeds and shock waves	4.1.3, 4.2
<b>Chapter 8. Temperature, heat and the first law of thermodynamics</b>	<b>5</b>
8.1. Temperature	4.1.1, 4.1.7, 4.2
8.2. The zero law of thermodynamics	4.1.7, 4.2
8.3. Measuring temperature	4.1.1, 4.1.7, 4.2
8.4. Thermal expansion	4.1.7, 4.2
8.5. Temperature and heat	4.1.7, 4.2
8.6. The absorption of heat by solids and liquids	4.1.7, 4.2
8.7. A closer look at heat and work	4.1.7, 4.1.4, 4.2
8.8. The first law of thermodynamics	4.1.7, 4.2
8.9. Heat transfer mechanism	4.1.7, 4.2
<b>Chapter 9. The kinetic theory of gasses</b>	<b>5</b>
9.1. Ideal gases	4.1.8, 4.2
9.2. Pressure, temperature and RMS speed	4.1.8, 4.1.2, 4.2
9.3. Translation kinetic energy and mean free path	4.1.8, 4.1.2, 4.2
9.4. The distribution of molecular speeds	4.1.8, 4.1.2, 4.2
9.5. The molar specific heats of an ideal gas	4.1.8, 4.2
9.6. Degree of freedom and molar specific heats	4.1.8, 4.2
9.7. The adiabatic expansion of an ideal gas	4.1.8, 4.2
<b>Chapter 10. Entropy and the second law of thermodynamics</b>	<b>5</b>
10.1. Irreversible processes and entropy	4.1.9, 4.2
10.2. The second law of thermodynamics	4.1.9, 4.2
10.3. Entropy in the real world: engines	4.1.9, 4.2
10.4. Entropy in the real world: refrigerators	4.1.9, 4.2
10.5. The efficiencies of real engines	4.1.9, 4.2
10.6. A statistical view of entropy	4.1.9, 4.2

## 7. Teaching method:

### 7.1 Language communication:

- 1- Giving lecture and presentation.
- 2- Oral method and problem – solving method
- 3- Watching and listening DVD physical experiments and discussion.

### 7.2 The Intuitive method:

- 1 - Method of illustrated experiments
- 2 – Using documentary film and performing difficult experiments to explain

### 7.3 Practice method:

- 1 - Creating a simulation method by Interactive physics software.
  - 2- Skill training with basic formula calculation by Matlab software.
  - 3 - Practicing with multiple-choice questions (MCQ).
- 7.4 Teaching methods using computer:
- 1- Teaching method based on website interaction (WBT: web-based training)
  - 2- Using the online exercises and examination (on-line learning)
  - 3- Using the online lectures (CBT: computer-based training)
- For teaching method, Informatics was more effective ways than the classical method.

### 8. Duties of student:

Students have to do the following duties:

- Attending at least 80% of the theoretical lessons.
- Joining 100% Lab work, practicing hours, complete all the training reporting, team group seminar and discussion summary and group exercise solutions.
- completing nearly 80% of the exercises for each chapter and sending on time to the teacher
- Attending middle term and final term examination.
- Submission of full practice reports, the outline of their seminars and created models from the modeling software.

### 9. Assessment of student learning outcomes:

#### 9.1. Assessment

No.	Point components	Rules and Requirement	Weights	Objectives
1	Assiduous	Attending at least 80% of the lecturing hours	5%	
2	Homework	Solving at least 75% of the exercises.	10%	
3	Groupworking	Giving seminars	10%	
4	Middle examination	Attending (required) Or taking the middle seminar Or writing an summary essay	35%	
5	Final examination	Attending (required)	40%	

#### 9.2. Grading

- Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place.
- Subject score is the sum of all the components of the evaluation multiplied by the corresponding weight. The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

### 10. Materials:

**Materials information**

**Code number**

- [1] David Halliday, Robert Resnick, Jearl Walker. **Fundamentals of Physics**, 530/ H188 530/ H188
- [2] David Halliday, Robert Resnick, Jearl Walker, **Cơ sở vật lý**, Tập 1, 2, 3 (Sách dịch), 530/ H188/T.1, 530/ H188/T.2, 530/ H188/T.3 530/ H188/T.1, 530/ H188/T.2, 530/ H188/T.3
- [3] Tipler, **Physics**. 530/ T595, 530/ T595/Vol.1, 530/ T595/Vol.2
- [4] Lương Duyên Bình, **Vật Lý đại cương** 530.07/ B312/T.1
- [5] I.E. Irôđôp, **Tuyển tập bài tập vật lý đại cương**. 530.076/ S263

### 11. Self-study Guide:

Week	Content	Theory (hours)	Practice (hours)	Students' duties
	<b>Chapter 1: Kinetics</b> 1.1..... 1.2. .... 1.3. .... 1.4..... 1.5. .... 1.6. ....	3	0	- Reading the textbook [1]: + Section 1.2, 1.7, Chapter (C) 1. + Section 3.2 - 3.8, C3. + Section 2.2 - 2.6, C2. + Section 4.8, C4. + Section 4.5 - 4.9, C4. + Section 2.9, C2.
	<b>Chapter 2: Dynamics</b> 2.1. .... 2.2. .... 2.3. .... 2.4. .... 2.5. .... 2.6. .... 2.7. ....	3	5	- Reading the textbook 1: + Section 5.2 - 5.3, C5. + Section 5.6, C5. + Section 5.7, C5. + Sections 6.2, 6.3, C6. + Section 4.7, C4; Section 6.5, C5. + Section 4.7, C4; Section 6.5, C5. + C13.
	<b>Chapter 3: Work and energy</b> 3.1. .... 3.2. .... 3.3. .... 3.4. .... 3.5. .... 3.6. .... 3.7. ....	3	5	- Reading the textbook [1]: + Section 7.4 - 7.8, C71. + Section 7.2,7.3,C7;Section8.2 - 8.6. + Section 8.3, C8. + Section 9.4, C9. + Section 8.5.,8.6,C8;Section9.7,C9. + Section 9.6, 9.11, C9. + C13.
	<b>Chapter 4: Rotational motion</b> 4.1. .... 4.2. .... 4.3. .... 4.4. .... 4.5. .... 4.6. ....	...	...	- Reading the textbook [1]: + Section 10.2, 10.3, C10. + Section 10.8, C8; 11.6, C11. + Section 10.7, C10. + Section 10.4,10.5, C10;11.8,C11. + Section 11.7, 11.11, C11. + Section 10.6, C10.
	<b>Chapter 5: Fluids</b>	...	...	- Reading the textbook [1]:

	5.1. .... 5.2. .... 5.3. .... 5.4. .... 5.5. .... 5.6. .... 5.7. ....			+ Section 14.1 -14.3, C14. + Section 14.4, C14. + Section 14.5,14.6, C14. + Section 14.7, C14. + Section 14.8, C14. + Section 14.9, C14. + Section 14.10, C14.
	<b>Chapter 6: Oscillations</b> 6.1. .... 6.2. .... 6.3. .... 6.4. .... 6.5. .... 6.6. .... 6.7. ....			- Reading the textbook [1]:  + Section 15.1, 14.2, C14. + Section 15.3, C15. + Section 15.4, C15. + Section 15.5, C15. + Section 15.6, C15. + Section 15.7, C15. + Section 15.8, C15.
	<b>Chapter 7: Waves</b> 7.1. .... 7.2. .... 7.3. .... 7.4. .... 7.5. .... 7.6. .... 7.7. .... 7.8. ....			- Reading the textbook [1]: + Section 16.1 - 16.6, C16. + Section 16.8, C16. + Section 16.9 - 16.13, C16. + Section 16.7, C16. + Section 17.1- 17.4, C17. + Section 17.6 - 17.8, C17. + Section 17.9, C17. + Section 17.10, C17.
	<b>Chapter 8: Temperature, heat and the first law of thermodynamics</b> 8.1. .... 8.2. .... 8.3. .... 8.4. .... 8.5. .... 8.6. .... 8.7. .... 8.8. .... 8.9. ....			- Reading the textbook [1]:  + Section 18.1, 18.2, C18. + Section 18.3, C18. + Section 18.4, 18.15, C18. + Section 18.6, C18. + Section 18.7, C18. + Section 18.8, C18. + Section 18.9, C18. + Section 18.10, 18.11, C18. + Section 18.12, C18.
	<b>Chapter 9: The kinetic theory of gasses</b> 9.1. .... 9.2. .... 9.3. .... 9.4. .... 9.5. .... 9.6. .... 9.7. ....			- Reading the textbook [1]:  + Section 19.1 -19.3, C19. + Section 19.4, C19. + Section 19.5, 19.6, C19. + Section 19.7, C19. + Section 19.8, C19. + Section 19.9, C19. + Section 19.11, C19.
	<b>Chapter 10: Entropy and the second law of</b>			- Reading the textbook [1]:

	<b>thermodynamics</b>			
	10.1. ....			+ Section 20.1 - 20.3, C20.
	10.2. ....			+ Section 20.4, C20.
	10.3. ....			+ Section 20.5, C20.
	10.4. ....			+ Section 20.6, C20.
	10.5. ....			+ Section 20.7, C20.
	10.6. ....			+ Section 20.8, C20.

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**ON BEHALF OF RECTOR  
DEAN/ DIRECTOR**

**HEAD OF DEPARTMENT**