THUY LOI UNIVERSITY
INTERNATIONAL TRAINING CENTER
PHYSICS DIVISION

SYLLABUS
Degree training: Bachelor

UNIVERSITY PHYSICS II
Code : PHYCS 2024

1. **Credit Amount** : 4 (2.1.1)
2. **Number of hours**: 60 standard hours;

Lecture (2 credits): 2 hours a week, lasting within 15 weeks

HW (1 credit): 2 hours a week, lasting within 15 weeks

Lab (1 credit): 6 hours a week, lasting within 5 weeks

3. **Belongs to the training program**
   - ***compulsory subject for*** civil engineering and water resources engineering
   - ***Optional subject :*** No
4. **Method for Students Grading**:

Form	Times	Description	Time	Percentage
Homework (Online HW + Long HW)	1 per week	Due EVERY lecture day and get turned in at the beginning of the first lecture of each week	During the course	25%
Quiz Test (Multiple choice)	1 per week	At the end of each Lecture	During the course	5%
03 Test (multiple-choice as well as free-response questions)	1 per month	Students can take Test in 60 minutes at the end of the 4^{th} week per month	During the course	30%

Attendance	Each lecture	To know the number of students' Absences: Absences >20% of 45 hours, will bi banned from taking final exam	During the course	
Experiment	10 experiments , 1 experiment is lasting for 3 hours	Students do Experiment in General Physics Lab (miss > 2 Labs : fail the course)	Lasting for 5 weeks or 10 weeks during the course	20%
Final Exam (Multiple -Choice)	1	90 minutes - 40 questions	1-2 weeks after the end of the course	20%

Structure of the final exam (according to Bloom scale):

Level	Remember	Understand	Application	Analysis	Synthetic	Creation
Number of question	15 MCQ	15 MCQ	10 MCQ			
Percentage	37,5%	37,5%	25%			

5. Binding conditions of the course:

- *Prerequisites*: **UPI**

- *Previous subject***: Math 1**

- *Parallel subject:* **Math 2**

6. Summary content of the course:

The course includes Electric field; Magnetic field; Induction and Electromagnetic Waves, Light. In this course students are introduced to the properties of electric field and magnetic field, can know the method how to calculate the magnitude of them. The course covers standards describing and calculate the behavior of electrical & magnetic devices, electromagnetic induction and its application including electromagnetic waves.

Electric Field:

- Electric Charge
- Electric Force and Electric Field
- Gauss' Law
- Conductors and Dielectrics
- Electric Potential
- Capacitance
- Circuits

Magnetic Field:

- Magnetism, Magnetic Field
- Magnetic Field of a curent
- Magnetic Force

Electromagnetic induction

- Faraday's Law and Maxwell's Equations
- Self – Induction, Mutual Induction
- Generator
- Transformers

Electromagnetic Waves and Light

- EM Waves

- Light

In Lab, each student must do 10 experiments as required in the instructor's policy and schedule.

7. Instructors:

NO	Full Name	Academic degree	Phone number	Email	Position
1	Đặng Thị Minh Huệ	Ph.D	0904769679	dtmhue@tlu.edu.vn	Main Lecturer
2	Phạm Thị Thanh Nga	Ph.D	0916103796	nga_ppt@tlu,edu.vn	Main Lecturer
3	Lương Duy Thành	Associate Professor, Ph.D	0936946975	thanh_lud@tlu.edu.vn	Senior

8. Text book :

[1] Course Materials of UPII is available at the University Library.

[2] Physics for Scientists and Engineers with Modern Physics (6 ED) , Paul A. Tipler and Gên Mosca , W. H. Freeman and Company, New York, 2000.

References:

[1] General Physics, Volume 2, Lương Duyên Bình et all (1998).

[2] University Physics with Modern Physics, H.D.Young - R.A.Freedman, 12ED.

9. Content in details:

Chapter	Content	Teaching and Learning Activities, Level of HW requirements	Hours		
			Lecture	Lab	HW
0	**INTRODUCTIONS**	*Lecturer - Introduce: full name, position, expertise and email, cell phone number and Course Website	**1**	**0**	**0**

		- Ask for information of the monitor of the class: email, phone number. - Introduce about syllabus of the subject and Grading critiria - Guide students how to get good results and best studying method * Students: - Answer the questions - Give out questions			
2	**ELECTRIC CHARGE** **2.1** Introduction to Electric Charge **2.2** Conservation of Charge **2.3** Quantization of Charge **2.4** Charge in a Macroscopic Object **2.5** What is a Macroscopic Net Charge **2.6** Continuous Charge Distributions	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problems - Guide students to solve problems - Give out questions -Guide students to solve samples -Assign homework as following requirements: + Calculate the amount of charge in matter + Calculate the density of charge in matter - Give out Solution of Homework * Students: - Answer the questions - Solve problems + situations - Give out questions	**1**	**2**	**1**

		- Do Homework			
3	**QUALITATIVE ELECTROSTATICS** **3.1** Basics of Electric Force **3.2** Effect of Electric Force on Materials **3.3** Capacity and Grounding **3.4** Shielding **3.5** Charging by Induction **3.6** Obtaining a Net Charge **3.7** Summary	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples - Assign homework as following requirements: + Calculate the charge distributed on the objects after touching together + Determine the type of charge on objects and how to make an object become a charge - Give out Solution of Homework *Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework	**1**	**2**	**1**
4	ELECTROSTATIC DEVICES **4.1** Electrophorus **4.2** Leaf Electroscope	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem	**1**	**0**	**0**

		- Give out questions *Students: - Answer the questions - Solve problems + situations - Give out questions			
5+6	**ELECTRIC FORCE. ELECTRIC FIELD** 5.1 The Strength of the Electric Force **5.3** Coulomb's Law **6.1**. Electric Field 6.4 Electric Field of Lines and Planes	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples - Assign homework as following requirements: + Determine electric force. +Determine electric field vector of a system of charge - Give out Solution of Homework *Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework	**2**	**3**	**3**
7	**ELECTRIC FIELD MAPS** **7.1** Gauss' Law, Field Lines, and Field Maps **7.2** Drawing Electric Field Maps	* Lecturer - Present; Explain; Analyze, Conclude - Give out Problem	**2**	**0**	**1**

	7.3 Drawing Field Maps for Continuous Charge Distributions **7.4** Combining Arrow Diagrams and Field Maps	- Guide students to solve problem - Give out questions - Guide students to draw field map - Assign homework: focus on drawing electric field maps *Students: - Answer the questions - Solve problems + situations - Give out questions			
8	**ELECTRIC DIPOLES** **8.1** Behavior of Electric Dipoles **8.2** Drawing Dipole Fields **8.3** Qualitative Dipole Behavior **8.4** Dipole Mechanics	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples - Assign homework as following requirements: + Determine electric field vector of the dipole + Determine the rotational direction of a dipole in external electric field + Calculate the electric potential energy - Give out Solution of Homework	**1**	**0**	**1**

		*Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework			
9	**GAUSS' LAW** **9.1** High Symmetry Systems **9.2** Electric Flux **9.3** Gauss' Law **9.4** Specializing Gauss' Law to the Symmetry **9.5** Drawing Spherical and Cylindrical Systems **9.6** Drawing Planar Systems **9.7** Applications of Gauss' Law **9.8** Gauss' Law Inside and Outside All Charge systems	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples: - Assign homework as following requirements: + Calculate Electric Flux; + Drawing field Maps for some high symmetry systems + Apply Gauss' Law for Spherical and Cylindrical Systems to find electric field and net charge - Give out Solution of Homework *Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework	**3**	**0**	**4**

10	**CONDUCTORS AND DIELECTRICS** **10.1** Response of Materials **10.2** Field Maps of Point Charges **10.3** Charge Density at a Surface **10.4** Planar Conductors and Dielectrics **10. 5** Superposition	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples - Assign homework: Calculate the density of charge on conductors and in dielectrics - Give out Solution of Homework *Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework	**2**	**2**	**2**
11	Gauss' Law Applied to Conductors and Dielectrics **11.1.** Making Equal and Opposite Charges **11.2** Parallel Plates **11.3** Spherical Problems **11.4** Non-Uniform Gauss' Law	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples - Assign homework as following requirements: + Drawing field Maps for	**1**	**2**	**2**

		dielectrics + Applying Gauss' Law for Parallel Plates with dielectric; Spherical systems to find electric field vector + Applying Gauss' Law to find the charge density - Give out Solution of Homework *Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework			
12	**ELECTRIC POTENTIAL** **12.1** Electric Potential, Potential Difference **12.2** Relationship between Potential anf Electric Field **12.3** Compute Electric Potential and Potential Difference from Electric Field **12.4** Compute Potential Directly from Charge **12.5** Potential in Highly Symmetric Systems 12.6 Electric Potential of a Continuous System of Charge **12.7** Electrostatic Energy **12.8** Electric Potential Energy and Motion	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples - Assign homework as following requirements: + Calculate Potential and Potential Difference from charge, system of charge; + Calculate Electric Potential Energy; + Calculate Work done by Electric Field	**3**	**2**	**3**

	12.9 Electrostatic Energy Density	+ Calculate Electric Field from Electric Potential function - Give out Solution of Homework *Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework			
13	**CAPACITANCE** **13.1** Definition of Capacitance **13.2** Capacitance and energy of a capacitor **13.3** Computing Capacitance	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples - Assign homework: Computing Capacitance of a two conductor time constant of RC circuits - Give out Solution of homework *Students - Answer the questions - Solve problems + situations - Give out questions - Do homework	**1**	**2**	**2**

14+15+16	**CURRENT AND RESISTANCE. DC CIRCUITS** **14.1** Current **14.2** Resistance **15.1** Ohm's Law **15.2** KKirchhoff's Laws **16.1** Capacitive Circuits **16.2** RC Circuits **16.6** What Does a Capacitor Do?	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples - Assign homework as following requirements: + Applying Ohm's Law and KKirchhoff's Laws to find current and resistance ; + Compute the Time Constant of RC circuit - Give out Solution of Homework *Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework	**1**	**2**	**1**
17+18	**MAGNETIC FIELD. AMPERE'S LAW** **17.1** No Magnetic Charge **17.2** Biot – Savart's Law **17.3** Magnetic Field of some current dibutions **17.4** Drawing the Magnetic Field **17.5** Superposition **18.1** Ampere's Law	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples	**3**	**3**	**3**

	18.2 Application of Ampere's Law	- Assign homework as following requirements: + Determine the net field of a circuit; + Drawing field lines; + Applying Ampere's Law - Answer the questions - Solve problems + situations - Give out questions - Do homework			
19	**MAGNETIC FORCE** **19.1** Magnetic Force **19.2** Circular Motion in a Uniform Magnetic Field **19.3** Forces on Currents and Wires	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Give out questions - Guide students to solve samples - Assign homework as following requirements: + Determine the Magnetic Force + Computing the quantities for circular motion in uniform magnetic field. - Give out Solution of Homework *Students: - Answer the questions - Solve problems + situations - Give out questions	**1**	**3**	**1**

		- Do homework			
20+21	**MAGNETIC** **DIPOLES. MAGNETIC MATERIALS** **20.1** Drawing and Reading Magnetic Field Maps **20.2**. Behavior of Dipoles in Magnetic Fields **21.1** Magnetic Materials **21.2** Ferromagnetism	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Assign homework with the focusing on Behavior of Dipoles in Magnetic Fields - Give out solution for Homework *Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework	**1**	**0**	**1**
22	**FARADAY'LAW** **22.1** Electromotive Force (EMS) **22.2**. Magnetic Flux **22.3** Faraday's Law **22.4** Generators	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem -Guide students to solve problem - Assign homework with the focusing on finding induced EMS; induced current in a closed wire - Give out solution for Homework *Students: - Answer the questions - Solve problems + situations - Give out questions	**2**	**2**	**2**

		- Do homework			
23+24	**INDUCTANCE** **23.1** Inductance **23.2** Inductors **23.3** Mutual Inductance and Transformers **23.4** Magnetic Energy **24.1** Inductance Circuit **24.2** RL Circuit	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem -Guide students to solve problem - Assign homework with the focusing on finding inductance and the time constant of RL circuit - Give out solution for Homework *Students: - Answer the questions - Solve problems + situations - Give out questions - Do homework	**1**	**2**	**1**
25+26	**MAGNETIC DEVICE. INDUCED ELECTRIC FIELD** **25.1** Devices Utilizing the Lorentz Force **25.2** Devices Utilizing Faraday's Law **26.1** Induced Electric Field **26.2** Maxwell's Equations	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem -Guide students to solve problem - Guide students to solve sample - Assign homework with the focusing on describing and finding induced Electric Field - Give out solution for Homework *Students: - Answer the questions - Solve problems + situations	**1**	**2**	**1**

		- Give out questions - Do homework			
27+28	**ELECTROMAGNETIC WAVES** **27.2** Electromagnetic Waves. Light **27.3** Properties of Light **27.4** Receiving and transmitting electromagnetic waves **28.2.** Reflection, refraction, interference of light	* Lecturer: - Present; Explain; Analyze, Conclude - Give out Problem - Guide students to solve problem - Guide students to solve samples related to Properties of Light *Students: - Answer the questions - Solve problems + situations - Give out questions	**1**	**1**	**0**
	Total		**30**	**30**	**30**

10. Expected Learning outcomes of UPII:

NO	Expected Learning outcomes of UPII	Expected Learning outcomes of respective training Programs
1	**Knowledge:** Understanding and applying the knowledge of the subject for calculating, simulating, analyzing, evaluating and synthesising some problems relating to civil engineering and water resources engineering. Details: + Descripting electric field and magnetic field; Computing the magnitude of electric field vector, magnetic field vector, and other its characteristic quantities;	-Applying the knowledge of general subjects to study, calculate, and solve problems ralating to the knowledge of the core knowledge and major Specilalized - Applying the core knowledge to solve the core problems and major problems.

	+ Descripting the behavior of electric devices and magnetic devices; +Descripting and calculating the propagation of electromagnetic waves; + Understanding and applying the knowledge of electric field, magnetic filed, induction, and electromagnetic waves to study the major fundermential knowledge and major Specilalized	
2	Ability: + Ability to work independently and function in multi-disciplinary teams; + Ability to self-study and life-long learning; +Ability to calculate, measurement conduct experiments and analyze, interpret data, report; +Ability to accept or reject theories based on Labs measurements + An ability to identify, formulate, and solve electric problems; magnetic problems; electromagnetic problems and electromagnetic waves	Ability to work independently and in team; Ability to self-study and self-thinking; Ability to apply knowledge of science (mathematics, physics, chemistry), and engineering principles, with emphasis on applications for water resources engineering and civil engineering; Ability to identify, formulate, analyze and choose the best model for each reality problems
3	Morality: + Having a high responsibility for work + Be honest, careful and persistent + Willing to learn and discover new knowledge + Having scientific thinking at work and scientific methods for learning and research	Have: + Good personal and professional ethics; + A spirit of learning and progress; + Be responsible for work, community and society; +Comply with the laws and regulations of the state, society and community.

11. Contact information of Physics Division

Address: Room 301 - A1, Thủy lợi University

Head of physics division : Dr. Phan Văn Độ

- Cell phone number: 0983652242
- Email: phanvando@tlu.edu.vn

Hà Nội, ngày tháng năm 2021

DEAN OF DEPARTMENT	INTERNATIONAL TRAINING CENTER	HEAD OF PHYSICS DIVISION
		Dr. Phan Văn Độ