MINISTRY OF EDUCATION AND TRAINING
CAN THO UNIVERSITY

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

DETAILED COURSE OUTLINE

1. Course title: Physics for Scientists and Engineers II

- **Course code : PH184C**
- **Credits : 04 (60 teaching hours -TH)**
- **Distribution: Theory: 50 TH; Practice: 5 TH; Realistic assignments: 2TH; Course projects: 3TH, Self study: 100 TH**

2. Course responsibility:

Department: Physics

Faculty: College of Natural Sciences

3. Prerequisites: None

4. Course objectives:

4.1 Knowledge: understanding and solving the application exercises in the fields:

4.1.1. Electricity included: Electric charge, electric dipole, electric field.

Application: explanation of all exercises for the law of charge conservation, Coulomb's law, electrical potential, electric field superposition principle for electric field, the electric potential, the electric field forces.

4.1.2. Capacitance, capacitors, capacitance applications in the resonant circuit.

Application: explanation of all exercises for a system of capacitors in parallel and in serial, the energy storing in the capacitors and computation for capacitance of the common types of different capacitors

4.1.3. Electric Current: intensity and current density, the electric current for different media, Ohm's law

Application: explanation of all exercises for computation of Resistors, Ohm's law, electric current power, Alternative current generation and system of resistors in serial and parallel connection, Kirchhoff's laws for closed circuit.

4.1.4. Magnetic interaction, magnetic field, magnetic intensity from the constant electric current, magnetic materials, magnetic dipole moment and the magnetization.

Application: explanation of all exercises for Bio Savart law to calculate the magnetic field due to a constant electric current, magnetic force exerted on the electric current, the Lorentz law, and Ampere’s law, magnetic properties in the solenoid wire, magnetic field in the toroidal pipe carry the electric current.

4.1.5 Electromagnetic waves and Maxwell's equations, the Faraday's law of electromagnetic induction, the Hall Effect, an alternating current generator.

Application: explanation of all exercises for AC generators, inductance, and RLC circuit The AC circuit, the current consummated power, the applications for electric current transmission.

4.1.6 Light waves, the laws of light refraction and light reflection, light absorption and the diffraction of light.

Application: explanation of all exercises for Huygens ' Principle about the interaction of many wave sources, lens formula for focal length, the imaging formula through the focus lens, the application of optical instruments.

4.1.7 Interference and diffraction of light, coherent light sources, light interferometer experiments for Young's double slots, the slit diffraction and diffraction for a small hole (Newton bright fringes)

Application: explanation of all exercises for determination of the maximum and minimum of light intensity for pattern interference, calculate distances in the circular Newtonian fringes system, the refractive index of the thin film, light properties of media through the Michelson interferometer, cyclical diffraction gratings in multiple system of parallel slits, diffraction grating length, the application of the pattern interference.

4.1.8 The phenomenon of light transmission: light absorption, Lamda Beer's law, the absorption coefficient, selective and non-selective absorption, light dispersion law, light scattering, light polarization phenomena. Normal and extra polarization. Malus's law for polarization.

Application: explanation of all exercises for light dispersion, dispersion coefficient, Ramann and Doll Till formula for light scattering, scattering by small molecules, refractive properties of the layered media, light intensity through two polarizers, application of light preparative phenomena.

4.2 Skills:

4.2.1 Professional skills

+ Measurement of electrical quantities and optical properties, using technical equipments as voltage meter, Ohmmeter, Ampere meter, gauss meter and so on.

+ Analyzing of qualitative and experimental data to explain the phenomena for electricity, magnetism, electromagnetic field, light wave and optical devices use for more real life applications.

+ Improving the ability to predict and simulate all the basic physics about electrical and optical phenomenon. Solving with electrical and optical problems and the electrical safety, the damage troubles for optical and electromagnetic machines ...

+ Understanding and operating the modern equipment in the field of optics and electricity as AC generator, oscilloscope machine, x ray diffraction machine, spectrometer, scattering in random media, electron microscopy, Michelson interferometer, diffraction gratings, polarization system....

+ Analyzing and processing the data obtained from experiments for the exact evaluation the advantage or disadvantage of the electro-optical system devices using in the scientific research and productive industry.

+ Realistic approach in factory working and productive facilities.

4.2.2 Flexible Skills

- Ability to give a professional seminar, Having good experiences for group working; Using computer for programming or statistic calculating as well as analyzing the experimental data.

- Ability to design the physical and experimental modeling using for advanced research and nature phenomenon. Take the advantage of modeling software as Interactive Physics (IP).

- Ability to make the scientific report using the English level for group working in the international co-operation media as global universities for the successful career in the future.

- Ability to listen for the lecturer and making the comment, good experiences for time plant control, solving the problem in study, search, aggregate, analyze and evaluate the information of social sciences and humanities as creative skills, writing assay skills and lifelong learning skills related to the physics field.

4.2.2 **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. Course content summary:

This course supports the students with the knowledge about electricity and Optics including the basic concepts of physics such as electrical charge, Coulomb's law, electric dipole, electric field, electric potential, electric potential energy and the electric field force. More over this course can give the knowledge of the electric intensity and electric current density for many different media, Ohm's law, electric power, resistors, and the resistors system in parallel and in series. They states the Kirchhoff 's laws for closed circuit, capacitance, capacitors, capacitors in parallel and in series, the energy saving in the capacitors, the applications for system of the capacitor in the resonant circuit, the concept of interaction in the capacitors, Magnetic field due to the direct current, The Bio Savart 's law from DC current, the Lorentz 's law and the Ampere 's law, using the solenoid wire to determine the electric inductance, magnetic field in toroidal pipes, magnetic materials, magnetic moment and the magnetic dipole. They gave the theory of the Electromagnetic waves related with the Maxwell equations of electromagnetic induction, the Faraday’s law applied in the AC generators and inductance material, RLC AC circuit, the current consumption, the wave energy transmission applications. For Optics: theory focus on the Light waves, the laws of refraction of light reflection, absorption and diffraction of light. Huygens principle of wave sources, optics and imaging formula through the lens, the application of optical instruments as light interference and diffraction, coherent light sources, light interferometer experiments through double slits experiments, light diffracted through a slit and over a small hole diffractions to determine the light maximum and minimum intensity, interference bright fringe, Newton’s fringes, Michelson interferometer, diffraction of light through the system so called diffraction gratings, light-absorbing applications, Lamda - Beer 's law, the absorption coefficient , selective absorption and

selective law of light dispersion, normal light dispersion and dispersion coefficient, light scattering , light polarization, refractive index of media, Malus 's law of light polarization.

6. Course content:

N_0	Content	Hours	Purpose
Chapter 1.	ELECTROSTATICS	**08**	
1.1	Electric charge	1	4.1.1; 4.2; 4.3
1.2	Coulomb's Law	1/2	4.1.1; 4.2; 4.3
1.3	Electric field	1/2	4.1.1; 4.2;4.3
1.4	Electric dipole	1/2	4.1.1; 4.2;4.3
1.5	Continuous charge distributions	1/2	4.1.1; 4.2;4.3
1.6	Electric fluxes and Gauss's law	1	4.1.1; 4.2;4.3
1.7	Field of a charged conductor	1	4.1.1; 4.2;4.3
1.8	Electric-fields of continuous charge distributions	1	4.1.1; 4.2;4.3
1.9	Electric potential energy	1	4.1.1; 4.2;4.3
1.10	Electrostatic potential	1/2	4.1.1; 4.2;4.3
1.11	Equipotential surface and relation between potential & electric field.	1/2	4.1.1; 4.2;4.3
1.12	Potential of point charges	1/2	4.1.1; 4.2;4.3
Chapter 2.	CAPACITORS	**04**	
2.1	Electric charge inside capacitors	1	4.1.2; 4.2;4.3
2.2	Capacitors in parallel	1	4.1.2; 4.2;4.3
2.3	Capacitors in series	1	4.1.2; 4.2;4.3
2.4	Energy stored in a capacitor	1/2	4.1.2; 4.2;4.3
2.5	Dielectrics	1/2	4.1.2; 4.2;4.3
Chapter 3.	CURRENT AND CIRCUITS	**04**	
3.1.	Electric current	1	4.1.3; 4.2;4.3
3.2.	Resistances	1/2	4.1.3; 4.2;4.3
3.3.	Resistors in series and in parallel	1/2	4.1.3; 4.2;4.3
3.4.	Power dissipation in a simple circuit	1/2	4.1.3; 4.2;4.3
3.5.	Batteries	1/4	4.1.3; 4.2;4.3
3.6.	Kirchhoff's rules	1	4.1.3; 4.2;4.3
3.7.	Charging and discharging a capacitor	1/4	4.1.3; 4.2;4.3
Chapter 4.	MAGNETISM	**08**	
4.1.	Magnetic field	1	4.1.4 4.2;4.3
4.2.	Trajectory of charges in constant Magnetic-fields	½	4.1.4 4.2;4.3
4.3.	Hall effect	½	4.1.4 4.2;4.3
4.4.	Force on a current	1	4.1.4 4.2;4.3
4.5.	Torque on a current carrying coil	½	4.1.4 4.2;4.3
4.6.	Magnetic field due to a current	1	4.1.4 4.2;4.3
4.7.	Force between two wires	½	4.1.4 4.2;4.3
4.8.	Magnetic field of a solenoid and toroid	½	4.1.4 4.2;4.3
4.9.	Ampere's law	1	4.1.4 4.2;4.3
4.10.	Induction	½	4.1.4 4.2;4.3
4.11.	Inductance and self-induction	1	4.1.4 4.2;4.3

Chapter 5.	MAGNETIC MATERIALS	**05**	
5.1.	Ampere-Maxwell's law and displacement current	1	4.1.4,4.2;4.3
5.2.	Gauss' law for magnetic fields	½	4.1.4,4.2;4.3
5.3.	Maxwell's equations	1,5	4.1.5,4.2,4.3
5.4.	L-C Oscillator	½	4.1.5,4.2,4.3
5.5.	R-L-C Oscillator	½	4.1.5,4.2,4.3
5.6.	RLC circuit	½	4.1.5,4.2,4.3
5.7.	Transformers	1	4.1.5,4.2,4.3
Chapter 6.	ELECTROMAGNETIC WAVES	**04**	
6.1.	Formation of Electromagnetic-waves	1	4.1.5,4.2,4.3
6.2.	Polarization of EW	1	4.1.5,4.2,4.3
6.3.	Energy of EW, density of EW energy.	1	4.1.5,4.2,4.3
6.4.	Reflection and Refraction	1	4.1.5,4.2,4.3
Chapter 7.	WAVE OPTICS FOR INTERFERENCE	**04**	
7.1.	Wave fronts and refraction	1	4.1.6,4.2,4.3
7.2.	Coherent light and interference	1	4.1.6,4.2,4.3
7.3.	Double-slit interference	1	4.1.6,4.2,4.3
7.4.	Thin-film interference	1	4.1.6,4.2,4.3
Chapter 8.	WAVE OPTICS FOR DIFFRACTION	**04**	
8.1	Introduction of diffraction	1	4.1.7,4.2,4.3
8.2	Huygens and Fresnel Law for diffraction	½	4.1.7,4.2,4.3
8.3	Single slit diffraction	1	4.1.7,4.2,4.3
8.4	Diffraction by a double slit (Fraunhofer diffraction)	1	4.1.7,4.2,4.3
8.5	Diffraction grating	½	4.1.7,4.2,4.3
Chapter 9.	LIGHT IN MEDIA	**04**	
9.1	Light absorption	1	4.1.8,4.2,4.3
9.2	Light scattering	½	4.1.8,4.2,4.3
9.3	Light dispersion	½	4.1.8,4.2,4.3
9.4	Polarization and Brewter law	1	4.1.8,4.2,4.3
9.5	Conclusion of light waves	1	4.1.8,4.2,4.3

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. Students 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. Evaluation for student learning :

9.1. Evaluating method:

Following the rule below:

N_0	**Content**	**Regulations**	Weight **presentage**	**Purpose**
1	**Assiduous**	**Attending at least 90% of the lecturing hours**	**5%**	**4.3**
2	**Exercises**	**Solving at least 75% of the exercises given by the lecturer.**	**5%**	**4.1; 4.2; 4.3**
3	**Prectise**	**Attending at least 99% of the Lab work. Sending all experimental reports on time**	**10%**	**4.1; 4.2; 4.3**
4	**Middle examination**	**Attending (required) Or taking the middle seminar Or writing an summary essay**	**30%**	**4.2; 4.3**
5	**Final examination**	**Attending (required)**	**60%**	**4.1; 4.2; 4.3...**

9.2. Synthetic marks

- The evaluation includes two components; the final exam scores end the middle term. They will be marked on a scale of 10 (0 to 10), exacted to one decimal part.
- Total score is the sum of all the components of the evaluation module multiplied by the corresponding weight.
- Final score will get the accuracy of a decimal and then converted to ABCDF scale under the provisions of the Academic Affairs of the CT University.

10. Learning materials

References	Số đăng ký cá biệt
[1] (Book) David Halliday, Robert Resnick, Jearl Walker. **Fundamentals of Physics** (Fourth edition)	(Fourth edition)
[2] (Book) David Halliday, Robert Resnick, Jearl Walker. **Fundamentals of Physics – questions and Solutions** (Fourth edition)	(Fourth edition)
[3] (Book) Jeft Sanny and William Moebs. **University Physics**	(second edition)
[4] (Book) Tipler. **Physics.**	(second edition)
[5] (Book) **Lương Duyên Bình -** Vật Lý đại cương tập 2, Vật Lý đại cương tập 3	**NXB GD 1998.**
[6] (Book) I.E. Irôđôp- **Tuyển tập bài tập vật lý đại cương**.	Version: 1988

11. Guide for self study:

Week	Contein	Theory (Hours)	Practise (Hours)	assignment
1	**chapter 1:.** **1.1 → 1.8**	4	0	-Reading theory book [1]: page 708 →742 and page 768 →802
2	**Chapter 1:** **1.9 → 1.12**			Solving exercises in book[1]: page: 742 (1→5^E, 6→8^E, 10P, 11→12P, 16→19P, 20 →22P, 23→26P, 33→35P, 36→38P, 51 →55^E, 62→65P, 81→84^E, 89, 90)
3	**Chapter 2:.....** **2.1 → 2.5**	4	0	-Reading theory book [1]: page 743 →767 and page 803 →838 Solving exercises in book[1]: page: 768 (5→8^E, 10^E, 11→14 P, 16→19^E, 22^E, 28 →31P, 43→46P,51 →53^E, 56P, 63P)
4	**Chapter 3:.....** **3.1 → 3.7**	4	0	-Reading theory book [1]: page 743 →767 and page 840 →903 Solving exercises in book[1]: page: 865 (3→6^E, 8→10^E, 11P, 13 →15P, 19→23 P, 27→29^E, 35→38P, 40→45P, 49→51P, 60→61P, 63→65^E, 71→73P)
5	**Chapter 4:.....** 4.1 → 4.7	4	0	-Reading theory book [1]: page 904 →937
6	**Chapter 4:.....** 4.8 → 4.11	4	0	Solving exercises in book[1]: page: 952 (3→9^E, 15→18P, 21→23P, 31—33E, 39P, 43)
7	**Chapter 5:.....** 5.1 → 5.7	4	0	-Reading theory book [1]: page 938 →978

				Solving exercises in book[1]: page: 971 (8, 10→14, 17, 20, 21, 3^E → 6^E , 10P, 12p 15-16^E,20P,22P,25→26P, 32→35P, 41-43P, 48P, 52)
8	**Chapter 6:.....** 6.1 → 6.4	4	0	-Reading theory book [1]:Page 979 →1034 Solving exercises in book[1]: page: 1034 (1^E, 5^E, 7^E, 9P, 11P, 12P, 16P, 19^E, 23^E, 24P, 28P, 36^E, 39P, 54P, 59P, 66P, 67P, 79P)
9	**Chapter 7:.....** 7.1. → 7.4	4	0	-Reading theory book [1]: Page 1035 →1076 Solving exercises in book[1]: page: 1067 (1^E, 5^E, 7^E, 8P, 10P, 12P,14P, 19^E,22^E, 24P,27P, 36^E,39P,55P,59P, 66P,67P, 74P, 78^E, 80P,83)
10	**Chapter 8:.....** 8.1. → 8.4	4	0	-Reading theory book [1]: Page1077 →1106 Solving exercises in book[1]: page: 1099 (3^E, 4^E, 8P, 12^E,14P,16P,21^E,27P, 32P, 68P,70^E, 78P, 80P)
11	**Chapter 9:.....** 8.1. → 8.3	4	0	-Reading theory book [1]: Page1107 →1185 and 1132 → 1176
12	**Chapter 9:.....** 8.4. → 8.7	4	0	Solving exercises in book[1]: page: 1148 → 1149 (4^E,6P, 7P,10P.13P)

Cần Thơ, ngày 20 tháng 2 năm 2014

TL. HIỆU TRƯỞNG
TRƯỞNG KHOA/VIỆN/BỘ MÔN

TRƯỞNG BỘ MÔN

Dương Hiếu Đẩu