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| UNIVERSITY OF TECHNOLOGY AND EDUCATION HOCHIMINH CITY  **Faculty of Applied Sciences** | **Major: Engineering branches**  **Level: Undegraduate**  **Program: High quality training** |

**COURSE SYLLABUS**

1. **Vietnamese name: Vật lý 2 Coursenumber: PHYS130502**
2. **English name: Principles of Physics 2**
3. **Credit number: 3** credits (3/0/6) (3credits in class, 0 credit in laboratory,6 credits at home)

Contribute to15 weeks (3 hours in class /week + 6 hours self–study /week)

1. **Instructors:**

1/ Main Lecturer: Do Quang Binh, Vo Thanh Tan,PhanGiaAnh Vu, Tran Tuan Anh, Luu Viet Hung, Pham ThanhTrung.

2/ List of the other lecturers: Huynh Quang Chien, Tran ThienHuan.

1. **Prerequisites**

Prerequisite courses: Mathematics 1, Principles of Physics 1, Principles of Physics - Laboratory 1

1. **Course Description**

This course provides students with the basic knowledge of physics including electricity, magnetism, light and optics, which is compulsory to access specialized courses in science, engineering and technology branches.

Students will be equipped with the knowledge of phenomena in the natural world, and can apply these knowledge in scientific research, and in technical and technological developments.

The content of the module consists of chapters 23 to 38 of the book “Physics for Scientists and Engineers with Modern Physics”, 9th Edition of R.A. Serway and J.W. Jewett.

The goal of this module is to help students become familiar with the scientific method, the fundamental laws of physics, improve their scientific knowledge of physics in general, reasoning skills, as well as strategies to prepare for learning in specialized science classes in programs for engineers. To achieve this goal, the module will provide both understandings of the concepts and skills of solving standard problems (homework) at the end of each chapter.

Besides, this module will help students understand how to build a mathematical model based on experimental results, how to record, display, analyze data and develop a model based on the data which can be used to predict the results of other experiments. At the same time, students will know the limits of the model and can use them in the prediction.

1. **Course Goals**

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| **Goals** | **Goal description**  *This course provides students:* | **Expected Learning Outcome of Program** |
| **G1** | Thebasic knowledge of electromagnetic theory for electric and magnetic fields; circuits, the laws of light and optics. | **1.1** |
| **G2** | The ability of analysis, interpretation and classification the physical phenomena related to electricity, magnetism and optics. | **2.1** |
| **G3** | Teamwork and communication skills | **3.1** |

1. **Courseobjectives and ELO**

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| **Course objectives** | | **Description**  *(Upon successful completion of this course, students will be able to)* | **ELOof Program** |
| **G1** | **1** | Understand the concepts, laws related to electric field, magnetic field as well as theory of electromagnetic field. | **1.1** |
| **2** | Understand the problems related to the basic circuits. | **1.1** |
| **3** | Understand the phenomena, laws of light, optics. | **1.1** |
| **G2** | **1** | Applying the knowledgeof electric field, magnetic field tointerpret the electromagnetic phenomena and to solve the related problems. | **2.1.1** |
| **2** | Applying the knowledge of the circuits to solve the related problems. | **2.1.1** |
| **3** | Applying the knowledge of light and optics to interpret the phenomena and solve the related problem. | **2.1.1** |
| **G3** | **1** | To express the learned knowledgeby problem solving capability and answer questions related to the concepts learned. | **3.1** |
| **2** | Clearly explain the concepts learned to another person. | **3.1** |
| **3** | Ability to work in groups to discuss and solve issues related to modern physics. | **3.2** |

1. **Learning materials**

**-** Textbooks:

1. R.A. Serway& J.W. Jewett; *Physics for Scientists and Engineers with Modern Physics*, 9th Edition; ISBN for bundle 9781285143811.

2. Physics 2 lectures summary, University of Technology and Education, HCMC.

**-** Other books recommended:

1. D. Hallyday et al: **Fundamentals of Physics**, Volume 4,5 and 6, John Willey & Sons,1999.
2. Tran Ngoc Hoi and Pham Van Thieu: General physics: Principles and Applications, Volume 3, Viet Nam Education Publishing House, 2006.
3. Luong Duyen Binh et al., General physics, volume 2 and 3, Viet Nam Education Publishing House, 2006.
4. Luong Duyen Binh et al., General physics workbook, volume 2 and 3, Viet Nam Education Publishing House, 1994.
5. Tran Thi Thien Huong and Huynh Quang Chien, General physics workbook **3,** University of Technology and Education, HCMC, 2005.
6. **Asssessesments**

Learning outcomes of students will be evaluated through the implementation of questions selected from homework; tests and final test.

- Grade scale: **10**

- Plan for assessements:

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| **Methodsforassessments** | **Content** | **Time** | **Methods** | **ELO** | **Ratedof grade (%)** |
| **Midterm** | | | |  | **50** |
| Test #1 | Qualitative and quantitative exercises on electric field, Gauss’s law, electric potential,electrical insulators. | Week 6th | Paper test in class |  | 20 |
| Test #2 | Qualitative and quantitative exercises on direct current, magnetic field, Faraday‘s law, and electromagnetic waves. | Week 11th | Paper test in class |  | 20 |
| Test online |  |  |  |  | 5 |
| Diligence |  |  |  |  | 5 |
| **Final exam** | | |  |  | **50** |
|  | - Including most course objectives.  - Test time 90 minutes. | Week 17th or 18th | Paper test |  | 50 |

1. **Contents and tentative schedule**

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| **Week** | **Content** | **Expected Learning Outcomes** |
|  | ***Chapter 23: Electric Fields*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods***: (3)*  **Content of lecture:**  ***Chapter 23: Electric Fields***  23.1 properties of Electric Charges 23.2 Charging Objects by Induction 23.3 Coulomb’s Law 23.4 Analysis Model: particle in a Field (Electric) 23.5 Electric Field of a Continuous Charge Distribution 23.6 Electric Field Lines 23.7 Motion of a Charged particle in a Uniform Electric Field  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/*** **Tasks for students at home** *(6)*  23.3 Coulomb’s Law 23.6 Electric Field Lines  Homework | **G1.1, G2.1** |
| 2 | ***Chapter 24: Gauss’s Law*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  ***Chapter 24: Gauss’s Law***  24.1 Electric Flux 24.2 Gauss’s Law 24.3 Application of Gauss’s Law to Various Charge Distributions 24.4 Conductors in Electrostatic Equilibrium  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  Homework | **G1.1, G2.1,** |
| 3 | ***Chapter: Electric potential*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  25.1 Electric Potential and Potential Difference 25.2 Potential Difference in a Uniform Electric Field 25.3 Electric Potential and Potential Energy Due to Point Charges 25.4 Obtaining the Value of the Electric Field from the Electric Potential 25.5 Electric Potential Due to Continuous Charge Distributions 25.6 Electric Potential Due to a Charged Conductor 25.7 The Millikan Oil-Drop Experiment 25.8 Applications of Electrostatics  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  25.7 The Millikan Oil-Drop Experiment 25.8 Applications of Electrostatics  Homework | **G1.1, G2.1,** |
| 4 | ***Chapter 26: Capacitance and Dielectrics (3/0/6)*** |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  26.1 Definition of Capacitance 26.2 Calculating Capacitance 26.3 Combinations of Capacitors 26.4 Energy Stored in a Charged Capacitor 26.5 Capacitors with Dielectrics 26.6 Electric Dipole in an Electric Field 26.7 An Atomic Description of Dielectrics  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  26.3 Combinations of Capacitors  26.5 Capacitors with Dielectrics  26.7 An Atomic Description of Dielectrics  Homework | **G1.1, G2.1,** |
| 5 | ***Chapter 27: Current and resistance*** *(3/0/6)* | |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  27.1 Electric Current 27.2 Resistance 27.3 A Model for Electrical Conduction 27.4 Resistance and Temperature 27.5 Superconductors 27.6 Electrical  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  27.5 Superconductors  Homework | **G1.1, G2.1** |
| 6 | ***Chapter 28: Direct-current circuits*** *(3/0/6)* | |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  28.1 Electromotive Force 28.2 Resistors in Series and Parallel 28.3 Kirchhoff’s Rules 28.4 *RC* Circuits 28.5 Household Wiring and electrical Safety  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  28.2 Resistors in Series and Parallel 28.5 Household Wiring and electrical Safety  Homework | **G1.1, G2.1** |
| 7 | ***Chapter 29: Magnetic Fields***  *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  29.1 Analysis Model: Particle in a Field (Magnetic) 29.2 Motion of a Charged Particle in a Uniform Magnetic Field 29.3 Applications Involving Charged Particles Moving in a Magnetic Field 29.4 Magnetic Force Acting on a Current-Carrying Conductor 29.5 Torque on a Current Loop in a Uniform Magnetic Field 29.6 The Hall Effect  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  29.3 Applications Involving Charged Particles Moving in a Magnetic Field 29.6 The Hall Effect  Homework | **G1.1, G2.1** |
| 8 | ***Chapter 30: Sources of the Magnetic Field (3/0/6)*** |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  30.1 The Biot–Savart Law 30.2 The Magnetic Force Between Two Parallel Conductors 30.3 Ampère’s Law 30.4 The Magnetic Field of a Solenoid 30.5 Gauss’s Law in Magnetism 30.6 Magnetism in Matter  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  30.2 The Magnetic Force Between Two Parallel Conductors 30.6 Magnetism in Matter  Homework | **G1.1, G2.1** |

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| 9 | ***Chapter 31: Faraday’s Law*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  31.1 Faraday’s Law of Induction 31.2 Motional emf 31.3 Lenz’s Law 31.4 Induced emf and Electric Fields 31.5 Generators and Motors 31.6 Eddy Currents  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  31.5 Generators and Motors 31.6 Eddy Currents  Homework | **G1.1, G2.1,** |

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| 10 | ***Chapter 32: Inductance*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  32.1 Self-Induction and Inductance 32.2 *RL* Circuits 32.3 Energy in a Magnetic Field 32.4 Mutual Inductance 32.5 Oscillations in an *LC* Circuit 32.6 The *RLC* Circuit  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  32.4 Mutual Inductance  Homework | **G1.1, G2.1,** |

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| 11 | ***Chapter 34: Electromagnetic Waves*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  34.1 Displacement Current and the General Form of Ampère’s Law 34.2 Maxwell’s Equations and Hertz’s Discoveries 34.3 Plane Electromagnetic Waves 34.4 Energy Carried by Electromagnetic Waves 34.5 Momentum and Radiation Pressure 34.6 Production of Electromagnetic Waves by an Antenna 34.7 The Spectrum of Electromagnetic Waves  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  34.5 Momentum and Radiation Pressure 34.6 Production of Electromagnetic Waves by an Antenna Homework | **G1.1, G2.1,** |

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| 12 | ***Chapter 35: The Nature of Light and the principles of ray Optics*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  35.1 The Nature of Light 35.2 Measurements of the Speed of Light 35.3 The ray approximation in ray Optics 35.4 analysis Model: Wave Under reflection 35.5 analysis Model: Wave Under refraction 35.6 Huygens’s principle 35.7 Dispersion 35.8 Total Internal reflection  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  35.2 Measurements of the Speed of Light 35.3 The ray approximation in ray Optics 35.4 analysis Model: Wave Under reflection 35.5 analysis Model: Wave Under refraction 35.8 Total Internal reflection  Homework | **G1.1, G2.1,** |

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| 13 | ***Chapter 36: Image Formation*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  36.1 Images Formed by Flat Mirrors 36.2 Images Formed by Spherical Mirrors 36.3 Images Formed by Refraction 36.4 Images Formed by Thin Lenses 36.5 Lens Aberrations 36.6 The Camera 36.7 The Eye 36.8 The Simple Magnifier 36.9 The Compound Microscope 36.10 The Telescope  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  36.6 The Camera 36.7 The Eye 36.8 The Simple Magnifier 36.9 The Compound Microscope 36.10 The Telescope  Homework | **G1.1, G2.1,** |

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| 14 | ***Chapter 37: Wave Optics*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  37.1 Young’s Double-Slit Experiment 37.2 Analysis Model: Waves in Interference 37.3 Intensity Distribution of the Double-Slit Interference Pattern 37.4 Change of Phase Due to Reflection 37.5 Interference in Thin Films 37.6 The Michelson Interferometer  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  37.6 The Michelson Interferometer  Homework | **G1.1, G2.1,** |

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| 15 | ***Chapter 38: Diffraction and polarization*** *(3/0/6)* |  |
| ***A/* Content of lecture and Teaching methods:** *(3)*  **Content of lecture:**  38.1 Introduction to Diffraction Patterns 38.2 Diffraction Patterns from Narrow Slits 38.3 Resolution of Single-Slit and Circular Apertures 38.4 The Diffraction Grating 38.5 Diffraction of X-Rays by Crystals 38.6 Polarization of Light Waves  **Teaching menthods** :   * Lecture * Slideshow * Focus group discussion (FGD) | **G1.1, G2.1, G3** |
| ***B/ Tasks for students at home***: *(6)*  38.5 Diffraction of X-Rays by Crystals  Homework | **G1.1, G2.1,** |

1. **Ethics in science**

Students have to do all exercises and tasks by themselves. The University has an appropriate punishment for students who break laws or engage in illegal action such as copying and certainly these students‘swill fail the class.

1. **Date of first approval:**
2. **Approval:**

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| **Dean of faculty** | **Head of Department** | **Editors** |
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1. **Updated history**

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| **1st update**: 17 Jannuary 2016 | **Editor**  **Head of Department** |