Basic Physics II

Module Name :	Basic Physics II	
Module Level :	Undergraduate	
Code :	32151253	
Sub-heading, if applicable :		
Classes, if applicable :		
Semester :	2st	
Module coordinator :	Dr. Anggara, M.Si.	
Lecturer(s) :	Dr. Anggara, M.Si. Prof. Dr. I Made Astra, M.Si.	
Language :	Indonesian	
Classification within the curriculum :	Compulsory course	
Type of Teaching	Contact hours per week during the semester	Class Size
Lecture (Expository, discussion, exercise)	150 minutes	40
Workload	Total workload of this course 136 hours (4.5 ECTS) per semester which consist of 40 hours (1.32 ECTS) classroom activity, 48 hours (1.59 ECTS) structured task, and 48 hours (1.59 ECTS) per semester.	
Credit points :	4.5 ECTS	
Prerequisite course(s) :	-	
Course Outcomes :	After taking this course the student have ability to : CLO69. Able to analyze and criticize the concepts of the basics of physics. CLO70. Able to build an understanding of the basics of physics CLO71. Able to implement the basics of physics. CLO72. Able to design basic physics experiments	
Content :	1. Electric Charge and Electric Force 1.1 Static electricity phenomena 1.2 Electric charge, quantization of charge, and the law of conservation of charge 1.3 Coulomb's law 1.4 Electric force among multiple point charges 2. Electric Fields 2.1 Electric field due to point charges 2.2 Electric field due to electric dipoles 2.3 Electric field due to continuous charge distributions 2.4 Point charges in an electric field 2.5 Electric dipoles in an electric field 3. Gauss's Law 3.1 Electric field flux	

	3.2 Gauss's law 3.3 Isolated conductors and their charges 3.4 Applications of Gauss's law for spherical, cylindrical, and planar symmetries 4. Electric Potential 4.1 Electric potential and potential difference 4.2 Relationship between electric potential and electric field 4.3 Electric potential due to point charges 4.4 Electric potential due to electric dipoles 4.5 Electric potential due to continuous charge distributions 4.6 Calculating electric fields from electric potentials 4.7 Electric potential energy, work in electric fields, and equipotential surfaces 4.8 Electric potential energy of point charge systems 4.9 Potential of isolated conductors 4.10 Capacitance and dielectrics 4.11 Electrical energy storage 5. Electric Current and Resistance 5.1 Electric current, current intensity, and current density 5.2 Resistance and resistivity 5.3 Ohm's law 5.4 Energy and power in electrical circuits 5.5 Semiconductors and superconductors 6. Direct Current Circuits 6.1 Series and parallel resistor circuits 6.2 Voltage sources (EMF) 6.3 Kirchhoff's laws and loop circuits 6.4 Resistor and capacitor circuits (RC) 7. Magnetism 7.1 Magnets and magnetic fields 7.2 Magnetic fields due to current-carrying conductors 7.3 Magnetic force on moving charges in a magnetic field 7.4 Magnetic force on current-carrying conductors in a magnetic field 7.5 Magnetic force on parallel current-carrying conductors 7.6 Ampere's law 7.7 Solenoids and toroids 7.8 Magnetic fields in magnetic materials

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7.9 Applications of magnetism in speakers, mass spectrometers, and accelerators

8. Electromagnetic Induction
8.1 Faraday's law
8.2 Lenz's law
8.3 Electromotive force (EMF) induced in a moving conductor in a magnetic field
8.4 Electric generators
8.5 RL circuits
8.6 Inductors and inductance
8.7 Energy in magnetic fields

9. Electromagnetic Oscillations and Alternating Current
9.1 Oscillations in LC circuits
9.2 Damped oscillations in RLC circuits
9.3 Alternating current (AC)
9.4 Series RLC circuits
9.5 Power in AC circuits

10. Electromagnetic Waves
10.1 Maxwell's equations
10.2 Generation of electromagnetic waves
10.3 Speed of light in the electromagnetic spectrum
10.4 Energy of electromagnetic waves
10.5 Applications of electromagnetic waves in communication devices
10.6 Reflection and refraction
10.7 Polarization
10.8 Interference
10.9 Diffraction
10.10 Dispersion of light

11. Photons and Matter Waves
11.1 Photons and the quantum of light
11.2 Photoelectric effect
11.3 Photons, momentum, and Compton scattering
11.4 The birth of quantum physics
11.5 Electrons and matter waves
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<td>Study/exam achievements:</td>
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Examination are conducted as unit test, as following
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<tr><th>No</th><th>Assesment Object</th><th>Assesment Technique</th><th>Weight</th></tr>
<tr><td>1</td><td>Case Base Learning</td><td>Examine cases in related fields of work as a means of solving them</td><td>50%</td></tr>
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<tr><td>2</td><td>Midterm Test</td><td>Presentation skills/ argumentation</td><td>20%</td></tr>
<tr><td>3</td><td>Final Test</td><td>UAP</td><td>20%</td></tr>
<tr><td>4</td><td>Attendance</td><td>Presence list</td><td>10%</td></tr>
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<tr><td>Media :</td><td>Computer/laptop, internet, projector, and Reference Book.</td></tr>
<tr><td>Literatures :</td><td>1. Fundamentals of Physics, 10th Ed. by David Halliday, Robert Resnick, and Jearl Walker (John Wiley & Sons, 2014).
2. Physics: Principles With Applications by Douglas C. Giancoli (Pearson, 2016).
3. University Physics 14th Ed. by Hugh D. Young and Roger A. Freedman (Pearson Education, 2016).
4. Design and Development of Pulse Electromagnetic Fields (PEMF) as Adjuvant Therapy for Fracture Healing, AIP Conference Proceeding 2092, 020028 (2019) by Umiatin et al.
5. Desain dan Pembuatan Prototipe Pulse Electromagnetic Therapy (PEMFT) untuk Studi Biolektromagnetik, Spektra, Jurnal Fisika dan Aplikasinya, Vol 2 No 3 (2017) by Umiatin et al.
6. Pelatihan Pembuatan Mikrohidro Untuk Pembangkit Listrik Daya Rendah Di Daerah Parung Kabupaten Bogor Provinsi Jawa Barat (2020) by M A Marpaung.
7. Rancang Bangun Sistem Wind Tunnel Sebagai Instrumen Pengukuran Karakteristik Turbin Angin Pembangkit Listrik Tenaga Angin (2021) by H Nasbey.
8. Rancang Bangun Sistem Pembangkit Listrik Hybrid (Gabungan Energi Angin Dan energi Surya) Sebagai Energi Alternatif Di FMIPA UNJ (2020) by H Nasbey.
9. Pelatihan Pembuatan Mini Microhidro Bagi Pelajar SMA (2020) by H Nasbey.
10. Physics Tutorial: http://www.masteringphysics.com/
11. Physics Simulation: http://phet.colorado.edu/en/simulations/category/physics
12. Youtube Physics Channel: http://www.youtube.com/user/univphys</td></tr>
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