MINISTRY OF EDUCATION AND CULTURE
UNIVERSITAS NEGERI SURABAYA
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
DEPARTMENT OF PHYSICS
Ketintang Campus, Jalan Ketintang, C3 Building, Surabaya 60231
Website: https://pendidikan-fisika.fmipa.unesa.ac.id/, email: s1-pfis@unesa.ac.id

Undergraduate Programme of Physics Education **Module Handbook**

Module Name :	*Listrik Magnet* Electromagnetism
Module level :	Bachelor degree/Undergraduate Programme
Course Code :	8420303115
Abbreviation, if applicable:	-
Courses included in the module, if applicable:	Not Applicable
Semester/Term	4/Second Year
Module coordinator(s)	
Lecturer(s):	Dr. Frida Ulfa Ermawati, M.Sc Diah Hari Kusumawati, M.Si. Abd. Kholiq, S.Pd, M.T.
Language:	*Bahasa Indonesia*
Classification within the curriculum:	Compulsory/ ~~Elective~~
Teaching format/class hours per week during the semester:	3 contact hours of lectures (Indonesia credit semester or sks*)
Workload :	3 x 50 minutes lectures, 3 x 60 minutes structured activity, 3 x 60 minutes individual activity, 14 weeks per semester, 135 total hours per semester ~ 4.77 ECTS**
Credit Point:	3 sks (4.77 ECTS)
Requirements:	Basic Physics II Mathematical Physics I Mathematical Physics II
Learning goals/competencies:	1. Have the ability to think critically and use appropriate concepts to analyze qualitatively problems or situations involving physics in this case electricity and magnetism. 2. Able to responsible for work in the field of expertise independently 3. Have the ability to use the concepts of physics and appropriate mathematical/computing methods to get solutions to quantitative problems in solving electric-magnetic problems. 4. Mastering the material, structure, and concepts of physics and their application in technology. 5. Implementing higher order thinking processes (critical, creative, logistical, and problem solving) in studying physical processes and phenomena, especially magnetism, both inductively and deductively.

<table>
<tr><td></td><td>6. Using symbolic and creative language creatively in describing processes and phenomena of electricity and magnetism qualitatively and quantitatively.</td></tr>
<tr><td>Content</td><td>Magnetic Electricity courses cover vector analysis, gradient, divergence, curl, Stokes' theorem, electric field, Coulomb's law, electric field, Gauss's law, electric potential, Electric dipole, electric energy multipole, field energy density, Laplace equation and Poisson equation, terms - boundary conditions, shadow methods, variable separation methods. dielectric material: polarization vector, polarizing charge, displacement vector D, Gauss's law for D. Electric Current: flow of electric charge, continuity equation. Magnetic field: Lorentz force, Biot-Savart law, vector potential, Ampere's law, magnetic dipole moment, switch potential, magnetization, magnetic poles, Ampere's law for H, magnetic materials, hysteresis. Magnetic effects, displacement currents, Maxwell's equations.</td></tr>
<tr><td>Attribute Soft skill:</td><td>Scientific report, public speaking, and team work</td></tr>
<tr><td>Study/exam achievements:</td><td>Students are considered to complete the course and pass if they obtain at least 40% of maximum final grade. The final grade (NA) is calculated based on the following ratio:
<table>
<tr><th>Assessment Components</th><th>Percentage of contribution</th></tr>
<tr><td>Participation</td><td>20%</td></tr>
<tr><td>Assignment</td><td>30%</td></tr>
<tr><td>Mid-semester test</td><td>20%</td></tr>
<tr><td>Final semester test</td><td>30%</td></tr>
</table></td></tr>
<tr><td>Learning Methods :</td><td>Student-centered approach, lecture and discussion, and presentations (structured activities)</td></tr>
<tr><td>Form of Media:</td><td>Power Point slides, e-book file, and multimedia.</td></tr>
<tr><td>Literature (primary references):</td><td>1. David J Griffiths, 1999, “ Introduction to Electrodynamics”, second edition, Prentice hall, International edition.
2. TIM. Buku Panduan Praktikum Lisrik Magnet. TIM Listrik Manget, 2018.
3. Reitz, JR. & Milford, FJ. 1990. Foundations of Elektromagnetic Theory. Third Edition Addison-Wesley Publishing Company Reading Masschusetts MenloPark. California.
4. Mahmud Zaki, 2000, “Medan Elektromagnetik (bagian I)”, Jurusan Fisika, FMIPA, ITS.</td></tr>
<tr><td>Notes:</td><td>*1 sks in learning process = three periods consist of: (a) scheduled instruction in a classroom or laboratory (50 minutes); (b) structured activity (60 minutes); and (c) individual activity (60 minutes) according to the Regulation of Indonesia Ministry of</td></tr>
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	Research, Technology, and Higher Education No. 44 Year 2015 jo. the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 50 Year 2018.
	**1 sks = 1,59 ECTS according to Rector Decree Of Universitas Negeri Surabaya No. 598/Un38/Hk/Ak/2019