

MODULE HANDBOOK
PHYSICS



BACHELOR DEGREE PROGRAM
DEPARTMENT OF STATISTICS
FACULTY OF SCIENCE AND DATA ANALYTICS
INSTITUT TEKNOLOGI SEPULUH NOPEMBER
SURABAYA, INDONESIA

ENDORSEMENT PAGE

	MODULE HANDBOOK PHYSICS DEPARTMENT OF STATISTICS INSTITUT TEKNOLOGI SEPULUH NOPEMBER
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Proses Process	Penanggung Jawab Person in Charge			Tanggal Date
	Nama Name	Jabatan Position	Tandatangan Signature	
Perumus <i>Preparation</i>	Dr.Sri Yani Purwaningsih	Dosen <i>Lecturer</i>		March 28, 2019
Pemeriksa dan Pengendalian <i>Review and Control</i>	Ir. Tutug Dhanardono, M.T	Tim kurikulum <i>Curriculum team</i>		April 15, 2019
Persetujuan <i>Approval</i>		Koordinator RMK <i>Course Cluster Coordinator</i>		July 17, 2019
Penetapan <i>Determination</i>	Dr. Kartika Fithriasari, M.Si	Kepala Departemen <i>Head of Department</i>		July 30, 2019

MODULE HANDBOOK

PHYSICS

Module name	Physics	
Module level	Undergraduate	
Code	SF184901	
Course (if applicable)	Physics	
Semester	1 st semester	
Person responsible for the module	Dr.Sri Yani Purwaningsih, M.Si	
Lecturer	Dr.Sri Yani Purwaningsih, M.Si; Ir. Tutug Dhanardono, M.T	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program, mandatory , 1 st semester.	
Type of teaching, contact hours	Lectures, <50 students	
Workload	1. Lectures: 3 x 50 = 150 minutes per week. 2. Exercises and Assignments: 3 x 60 = 180 minutes (3 hours) per week. 3. Private learning: 3 x 60 = 180 minutes (3 hours) per week.	
Credit points	3 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.	
Mandatory prerequisites	-	
Learning outcomes and their corresponding PLOs	CLO.1 Understand the physical quantities and unit, including the characteristics of scalar and vector quantities	PLO.1
	CLO.2 Understand the definition of straight and curved motion in graphical and mathematical including its application	PLO.4
	CLO.3 Understand the basic principle of Newton Laws and the types of Force including its application	
	CLO.4 Understand the concept of Work and Energy, mechanic energy, The principle of conservation of mechanical energy and its application	
	CLO.5 Apply the concept of impulses and momentum, conservation of momentum, collisions and their applications	
	CLO.6 Understand the principles of rigid body rotational and translational motion including its application	
	CLO.7 Understand the concept of rigid body equilibrium and its application	

	CLO.8 Understand the mechanics of objects transition and elasticity including its application CLO.9 Understand simple harmonic oscillator, superposition of two vibrations and their application CLO.10 Understand the concepts of hydrostatics and hydrodynamics and their application	
Content	In this course, the students will learn to understand the laws of basic physics, Particle kinematics; Particle dynamics; Work and energy; Rotational motion; Vibration and Fluid Mechanics, through simple mathematical explanations and apply the concept including analyzing the material in practicum. The practicum includes physical pendulum, mathematical pendulum, spring constant, fluid viscosity, projectile motion, friction coefficient, and moment of inertia.	
Study and examination requirements and forms of examination	• In-class exercises • Assignment • Mid-term exam • Final exam	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	
Reading list	Main references: 1. Halliday, Resnic, Jearl Walker, 'Fundamental of Physics'. John Wiley and Sons, 10th ed, New York, 2014 2. Douglas C. Giancoli, 'Physics for Scientists and Engineers', Pearson Education, 4th ed, London, 2014 3. Tim Dosen Fisika, "Fisika 1 Mekanika & Termodinamika untuk Sains dan Teknik", Fisika FIAITS, 2018 4. -, "Petunjuk Praktikum Fisika Dasar", Fisika, MIPA-ITS Supporting references: 1. Sears & Zemanky, "University Physics", Pearson Education, 14th ed, USA, 2016 2. Tipler, PA, 'Physics for Scientists and Engineers', 6th ed, W.H. Freeman and Co, New York, 2008	

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	Semester	I
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RP-S1	Dosen Pengampu	Tim Dosen Fisika Dasar

Bahan Kajian	
<i>Study Materials</i>	
CPL yang dibebankan MK	CPL-1 Mampu menerapkan pengetahuan teori statistika, matematika, dan komputasi CPL-6 Memiliki pengetahuan tentang isu terkini dan mendatang yang berkaitan dengan bidang statistika dan sains data <i>PLO-1 Able to apply knowledge of science, statistical theory, mathematics, and computing to problems in various applied fields</i> <i>PLO-6 Having knowledge of current and upcoming issues using statistical and data science</i>
CP-MK	
CLO	

Perte- muan <i>Meeting</i>	Kemampuan Akhir Sub CP-MK <i>Final Ability</i>	Keluasan (materi pembelajaran) <i>Extent (learning material)</i>	Metode Pembelajaran <i>Learning methods</i>	Estimasi Waktu <i>Duration</i>	Bentuk Evaluasi <i>Evaluation Type</i>	Kriteria dan Indikator Penilaian <i>Assessment Criteria and Indicators</i>	Bobot Penilaian <i>Scoring</i>
1,2	Mahasiswa mampu menjelaskan Kinematika dan Dinamika partikel: <i>The students are able to explain the particle kinematics and Dynamics</i>	Kinematika dan Dinamika partikel: <i>Particle kinematics and Dynamics</i>	Kontrak belajar, Kuliah Klasikal, ILE <i>Course Agreement, Lecture, ILE</i>	4 x 50 menit <i>4 x 50 minutes</i>	Diskusi, Tugas <i>Discussion, Assignment</i>	Mahasiswa mampu menjelaskan Kinematika dan Dinamika partikel: <i>The students are able to explain the particle kinematics and Dynamics</i>	3%
3,4,5	Mampu menjelaskan Kerja dan energi: konsep kerja, energi kinetik, energi potensial (gravitasi dan pegas), hukum kekekalan energi mekanik, impuls, momentum, tumbukan; <i>Work and energy: the concept of work, kinetic</i>	Kerja dan energi: konsep kerja, energi kinetik, energi potensial (gravitasi dan pegas), hukum kekekalan energi mekanik, impuls, momentum, tumbukan; <i>Work and energy: the concept of work, kinetic</i>	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	2 x 50 menit <i>2 x 50 minutes</i>	Diskusi, Tugas <i>Discussion, Assignment</i>	Mampu menjelaskan Kerja dan energi: konsep kerja, energi kinetik, energi potensial (gravitasi dan pegas), hukum kekekalan energi mekanik, impuls, momentum, tumbukan; <i>Able to explain work and energy: the concept of work,</i>	3 %



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	<i>Able to explain work and energy: the concept of work, kinetic energy, potential energy (gravity and spring), the law of conservation of mechanical energy, impulse, momentum, collision</i>	<i>energy, potential energy (gravity and spring), the law of conservation of mechanical energy, impulse, momentum, collision</i>				<i>kinetic energy, potential energy (gravity and spring), the law of conservation of mechanical energy, impulse, momentum, collision</i>	
6,7,8,9	Memahami Dinamika rotasi: pusat massa, momen gaya (torsi), kesetimbangan momen gaya, momen inersia, energi kinetik rotasi, gerak menggelinding, hukum kekekalan energi (translasi dan rotasi) <i>Understand the rotational dynamics: the center of mass, force moment (torque), force moment equilibrium, the moment of inertia, rotational kinetic energy, rolling motion, the energy</i>	Dinamika rotasi: pusat massa, momen gaya (torsi), kesetimbangan momen gaya, momen inersia, energi kinetik rotasi, gerak menggelinding, hukum kekekalan energi (translasi dan rotasi) <i>Rotational dynamics: the center of mass, force moment (torque), force moment equilibrium, moment of inertia, rotational kinetic energy, rolling motion, the energy</i>	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	2 x 50 menit <i>2 x 50 minutes</i>	Diskusi, Tugas <i>Discussion, Assignment</i>	Mahasiswa memahami Dinamika rotasi: pusat massa, momen gaya (torsi), kesetimbangan momen gaya, momen inersia, energi kinetik rotasi, gerak menggelinding, hukum kekekalan energi (translasi dan rotasi) <i>The students understand the rotational dynamics: the center of mass, force moment (torque), force moment equilibrium, the moment of inertia, rotational kinetic energy, rolling motion, the energy conservation law (translation and rotation)</i>	3 %

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	<i>conservation law (translation and rotation)</i>	<i>conservation law (translation and rotation)</i>					
10		QUIZ 1		2 x 50 menit <i>2 x 50 minutes</i>			10%
11,12	Mahasiswa memahami Getaran: gerak harmonis sederhana, energi gerak harmonis sederhana, bandul matematis, bandul fisis, bandul Puntir <i>The students understand the vibration: simple harmonic motion, the energy of simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum</i>	• Getaran: gerak harmonis sederhana, energi gerak harmonis sederhana, bandul matematis, bandul fisis, bandul puntir • <i>Vibration: simple harmonic motion, the energy of simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum</i>		2 x 50 menit <i>2 x 50 minutes</i>		Mahasiswa memahami getaran: gerak harmonis sederhana, energi gerak harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, <i>The students understand the vibration: simple harmonic motion, the energy of simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum</i>	
13,14 minggu ke 7)	Memahami Mekanika fluida: tekanan hidrostatika, prinsip Pascal, prinsip Archimedes, persamaan kontinuitas, persamaan Bernoulli,	Mekanika fluida: tekanan hidrostatika, prinsip Pascal, prinsip Archimedes, persamaan kontinuitas, persamaan Bernoulli <i>Fluid mechanics: hydrostatic pressure,</i>	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	4 x 50 menit <i>4 x 50 minutes</i>	Diskusi, Tugas <i>Discussion, Assignment</i>	Mekanika fluida: tekanan hidrostatika, prinsip Pascal, prinsip Archimedes, persamaan kontinuitas, persamaan Bernoulli, <i>Fluid mechanics: hydrostatic pressure, Pascal's principle, Archimedes' principle, surface</i>	3%

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	<i>Understand the fluid mechanics: hydrostatic pressure, Pascal's principle, Archimedes' principle, surface tension, continuity equation, Bernoulli's equation</i>	<i>Pascal's principle, Archimedes' principle, surface tension, continuity equation, Bernoulli's equation</i>				<i>tension, continuity equation, Bernoulli's equation</i>	
17,18 Minggu ke 9	Mahasiswa memahami Medan Listrik :Hukum Coulomb; kuat medan listrik, perhitungan kuat medan listrik; <i>The students understand the Electric Field: Coulomb's Law; the strength of an electric field, the calculation of the strength of an electric field</i>	Medan Listrik: Hukum Coulomb; kuat medan listrik, perhitungan kuat medan listrik; <i>Electric Field: Coulomb's Law; the strength of an electric field, the calculation of the strength of an electric field</i>	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	4 x 50 menit <i>4 x 50 minutes</i>	Diskusi, Tugas <i>Discussion, Assignment</i>	Mahasiswa mampu menjelaskan Medan Listrik :Hukum Coulomb; kuat medan listrik, perhitungan kuat medan listrik; <i>The students are able to explain the Electric Field: Coulomb's Law; the strength of an electric field, the calculation of the strength of an electric field</i>	3
19,20, 21,22	Mahasiswa memahami Potensial listrik dan Kapasitor: energi potensial, beda potensial listrik, perhitungan potensial listrik, Kapasitansi, rangkaian Kapasitansi, rangkaian	Potensial listrik dan Kapasitor: energi potensial, beda potensial listrik, perhitungan potensial listrik, Kapasitansi, rangkaian kapasitor, energi kapasitor;	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	2 x 50 menit <i>2 x 50 minutes</i>	Diskusi, Tugas <i>Discussion, Assignment</i>	Mahasiswa mampu menjelaskan Potensial listrik dan Kapasitor: energi potensial, beda potensial listrik, perhitungan potensial listrik,	3

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	kapasitor, energi kapasitor; <i>The students understand the electric potential and capacitance: potential energy, electric potential difference, electric potential calculation, Capacitance, capacitor circuit, capacitor energy</i>	<i>Electric potential and capacitance: potential energy, electric potential difference, electric potential calculation, Capacitance, capacitor circuit, capacitor energy</i>				Kapasitansi, rangkaian kapasitor, energi kapasitor; <i>The students are able to explain the electric potential and capacitance: potential energy, electric potential difference, electric potential calculation, Capacitance, capacitor circuit, capacitor energy</i>	
23, 24	Mahasiswa memahami Arus listrik dan Resistor: arus listrik, hukum Ohm, rangkaian resistor, energi dan daya listrik; Rangkaian arus searah, hukum Kirchoff <i>The students understand the electric currents and resistors: electric currents, Ohm's law, resistor circuits, energy and electric power; direct</i>	Arus listrik dan Resistor: arus listrik, hukum Ohm, rangkaian resistor, energi dan daya listrik; Rangkaian arus searah, hukum Kirchoff <i>Electric currents and resistors: electric currents, Ohm's law, resistor circuits, energy and electric power; direct current circuits, Kirchoff's law</i>	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	2 x 50 menit <i>2 x 50 minutes</i>	Diskusi, Tugas <i>Discussion, Assignment</i>	Mahasiswa mampu menjelaskan Arus listrik dan Resistor: arus listrik, hukum Ohm, rangkaian resistor, energi dan daya listrik; Rangkaian arus searah, hukum Kirchoff, <i>The students are able to explain the electric currents and resistors: electric currents, Ohm's law, resistor circuits, energy and electric power; direct current circuits, Kirchoff's law</i>	3 %

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	<i>current circuits, Kirchoff's law</i>						
25		QUIZ II		2 x 50 menit <i>2 x 50 minutes</i>			10%
26 Minggu ke 13	Memahami Arus listrik dan Resistor: arus listrik, hukum Ohm, rangkaian resistor, energi dan daya listrik; Rangkaian arus searah, hukum Kirchoff <i>Understand the electric currents and resistors: electric currents, Ohm's law, resistor circuits, energy and electric power; direct current circuits, Kirchoff's law</i>	Arus listrik dan Resistor: arus listrik, hukum Ohm, rangkaian resistor, energi dan daya listrik; Rangkaian arus searah, hukum Kirchoff, <i>Electric currents and resistors: electric currents, Ohm's law, resistor circuits, energy and electric power; direct current circuits, Kirchoff's law</i>	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	2 x 50 menit <i>2 x 50 minutes</i>		Mahasiswa mampu menjelaskan Arus listrik dan Resistor: arus listrik, hukum Ohm, rangkaian resistor, energi dan daya listrik; Rangkaian arus searah, hukum Kirchoff, <i>The students are able to explain the electric currents and resistors: electric currents, Ohm's law, resistor circuits, energy and electric power; direct current circuits, Kirchoff's law</i>	
27,28	Memahami Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada Inductor	Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada induktor; <i>Faraday's law, Lenz's law, induced EMF, self inductance and mutual</i>	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	2 x 50 menit <i>2 x 50 minutes</i>		Mahasiswa mampu menjelaskan Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada inductor	3

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	<i>Understand the Faraday's law, Lenz's law, induced EMF, self inductance and mutual inductance; energy in the inductor</i>	<i>inductance; energy in the inductor</i>				<i>The students are able to explain the Faraday's law, Lenz's law, induced EMF, self inductance and mutual inductance; energy in the inductor</i>	
29	Memahami Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada induktor <i>Understand the Faraday's law, Lenz's law, induced EMF, self inductance and mutual inductance; energy in the inductor</i>	Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada induktor; <i>Faraday's law, Lenz's law, induced EMF, self inductance and mutual inductance; energy in the inductor</i>	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	2 x 50 menit <i>2 x 50 minutes</i>		Mahasiswa mampu menjelaskan Memahami Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada induktor; <i>The students are able to explain the Faraday's law, Lenz's law, induced EMF, self inductance and mutual inductance; energy in the inductor</i>	3
30	Memahami Arus bolak-balik: Impedansi, rangkaian R-L-C, Daya <i>Understand the alternating current: impedance, R-L-C circuit, power</i>	Arus bolak-balik: Impedansi, rangkaian R-L-C, Daya. <i>Alternating current: impedance, R-L-C circuit, power</i>	Kuliah Klasikal, ILE <i>Lecture, ILE</i>	2 x 50 menit <i>2 x 50 minutes</i>		Mahasiswa mampu menjelaskan Arus bolak-balik: Impedansi, rangkaian R-L-C, Daya. <i>The students are able to explain the alternating current: impedance, R-L-C circuit, power</i>	3

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31,32	EAS FINAL EXAM						20%

PUSTAKA/*REFERENCES*: -