MODULE HANDBOOK

PHYSICS 2

BACHELOR DEGREE PROGRAM
DEPARTMENT OF BIOMEDICAL ENGINEERING
FACULTY OF INTELLIGENT ELECTRICAL AND INFORMATICS TECHNOLOGY

INSTITUT TEKNOLOGI SEPULUH NOPEMBER

MODULE HANDBOOK
PHYSICS 2

Module name	**Physics 2**	
Module level	Undergradute	
Code	SF184202	
Course (if applicable)	Physics 2	
Semester	Second Semester (Genap)	
Person responsible for the module	ITS Physics Lecturer Team	
Lecturer	ITS Physics Lecturer Team	
Language	Bahasa Indonesia	
Relation to curriculum	Undergradute degree program, **mandatory**, 2nd semester.	
Type of teaching, contact hours	Lectures, <60 students	
Workload	1. Lectures : 3 x 50 = 150 minutes per week. 2. Exercises and Assignments : 2 x 60 = 120 minutes (2 hours) per week. 3. Private learning : 2 x 60 = 120 minutes (2 hours) per week.	
Credit points	3 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 75% of the lectures to sit in the exams.	
Mandatory prerequisites	-	
Learning outcomes and their corresponding PLOs	CLO 1 Students understand particles that compose a matter and it's electrical properties, substantial of conductor and dielectric CLO 2 Students understand the strength of an electric field based on Coulomb force and Gauss's law CLO 3 Students are able to understand various forms of electric potential in charged conductors CLO 4 Students understand the capacitance principle of various form of capacitor in capacitor circuits, series, parallel and mixed CLO 5 Able to use magnetic field force formulas for electric currents and moving charges CLO 6 Able to mention the role of magnetization in magnetic material and hysteresis loop. CLO 7 Understand the principle of electromotive force emergences, and current in resistor, capacitor and inductor	Not mentioned

	CLO 8 Able to determine magnitude of the impedance, electric current and phase angle in parallel and series circuit R-L, R-C, RL-C	
Content	In this course students will learn to understand the basic laws of physics, Electric Field; Electric Potential; Electric current ; Magnetic field; Electriomotive Force (EMF) of Induction and Alternating Current, through simple math descriptions and introducing the examples of concepts usage	
Study and examination requirements and forms of examination	● In-class exercises ● Assignment 1, 2, 3 ● Mid-term examination ● Final examination	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	
Reading list	Main : 1. Halliday & Resnic; 'Fundamental of Physics'. John Wiley and Sons, New York, 1987 2. Tim Dosen, "Diktat Fisika II", ”Soal-soal Fisika II", Fisika FMIPA-ITS 3. Giancoli, DC., (terj, Yuhilza H), 'Fisika, jilid 2', Ertangga, Jakarta, 2001. Supporting : 1. Alonso & Finn,"Fundamental University Physics", Addison Wesley Pub Comp Inc,1`.ed, Calf, 1990 2. Tipler, PA,(ted. L Prasetio dan R.W.Adi), "Fisika : untuk Sains dan Teknik, Jilid 2", Erlangga, Jakarta, 1998	

I. Rencana Pembelajaran Semester / *Semester Learning Plan*

	INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS) **FACULTY OF INTELLIGENT ELECTRICAL AND INFORMATICS TECHNOLOGY** **DEPARTMENT OF BIOMEDICAL ENGINEERING**	**Document Code**

SEMESTER LEARNING PLAN

MATA KULIAH (MK) *COURSE*	KODE *CODE*	Rumpun MK *Course Cluster*	BOBOT (sks) Credits		SEMESTER	Tgl Penyusunan *Compilation Date*
Fisika 2 ***Physics 2***	SF184202	SPKB *SPKB*	T=3	P=0	II	Feb 27, 2020
OTORISASI / PENGESAHAN ***AUTHORIZATION / ENDORSEMENT***	**Dosen Pengembang RPS** ***Developer Lecturer of Semester Learning Plan***		**Koordinator RMK** ***Course Cluster Coordinator***		**Ka DEPARTEMEN** ***Head of Department***	

Capaian Pembelajaran ***Learning Outcomes***	**CPL-PRODI yang dibebankan pada MK** ***PLO Program Charged to The Course***	
	CPL-01 *PLO-01*	Mampu **menerapkan** Ilmu Pengetahuan Alam dan Matematika pada bidang Teknik Biomedika. *Able to **apply** Natural Sciences and Mathematics in the field of Biomedical Engineering.*
	CPL-03 *PLO-03*	Mampu **merancang** dan **melaksanakan** eksperimen laboratorium dan/atau lapangan, **menganalisa** dan **menginterpretasi** data, serta menggunakan penilaian yang obyektif untuk menarik kesimpulan. *Able to **design** and **implement** laboratory experiment and / or field experiments, **analyze** and **interpret** data, and use objective assessments to draw conclusions.*
	Capaian Pembelajaran Mata Kuliah (CPMK) ***Course Learning Outcome (CLO) - If CLO as description capability of each Learning Stage in the course, then CLO = LLO***	
	CP MK 1 ***CLO 1***	Mahasiswa memahami butir-butir penyusun materi serta sifat kelistrikannya, hakekat konduktor dan dielektrik. *Students understand particles that compose a matter and it's electrical properties, substantial of conductor and dielectric*
	CP MK 2 ***CLO 2***	Mahasiswa memahami kuat medan listrik berdasarkan gaya Coulomb dan hukum Gauss. *Students understand the strength of an electric field based on Coulomb force and Gauss's law.*

	CP MK 3 ***CLO 3***	Mahasiswa mampu memahami berbagai bentuk potensial listrik pada konduktor bermuatan. *Students are able to understand various forms of electric potential in charged conductors..*
	CP MK 4 ***CLO 4***	Mahasiswa memahami azas kapasitansi berbagai bentuk kapasitor pada rangkaian kapasitor, seri, paralel dan campuran. *Students understand the capacitance principle of various form of capacitor in capacitor circuits, series, parallel and mixed.*
	CP MK 5 **CLO 5**	Mampu menggunakan rumus gaya medan magnit terhadap arus listrik dan muatan bergerak *Able to use magnetic field force formulas for electric currents and moving charges*
	CP MK 6 ***CLO 6***	Mampu menyebutkan peranan magnetisasi dalam material magnetik dan hystensis loop *Able to mention the role of magnetization in magnetic material and hysterisis loop*.
	CP MK 7 **CLO 7**	Memahami prinsip timbulnya gaya gerak listrik, dan arus dalam resistor, kapasitor dan induktor *Understand the principle of electromotive force emergences, and current in resistor, capacitor and inductor*
	CP MK 8 **CLO 8**	Mampu menentukan besar impendansi besar arus listrik dan sudut fasa pada rangkaian seri paralel R-L, R-C, RL- C *Able to determine the magnitude of impedance, electric current and phase angle in parallel and series circuit R-L, R-C, RL-C*

Peta CPL – CP MK

Map of PLO - CLO

	CPL-01	**CPL-02**	**CPL-03**	**CPL-04**	**CPL-05**	**CPL-06**	**CPL-07**	**CPL-08**	**CPL-09**	**CPL-10**	**CPL-11**	**CPL-12**
CPMK 1 / SUB CPMK 1 *CLO 1 / LLO 1*			□									
CPMK 2 / SUB CPMK 2 *CLO 2 / LLO 2*			□									
CPMK 3 / SUB CPMK 3 *CLO 3 / LLO 3*	□											
CPMK 4 / SUB CPMK 4 *CLO 4 / LLO 4*	□											
CPMK 5 / SUB CPMK 5 *CLO 5 / LLO 5*			□									

CPMK 6 / SUB CPMK 6 *CLO 6 / LLO 6*			□										

Diskripsi Singkat MK ***Short Description of Course***	Pada mata kuliah ini mahasiswa akan belajar memahami hukum-hukum dasar fisika, Medan Listrik; Potensial Listrik; Arus Listrik ; Medan magnet; Gaya Gerak Listrik (EMF) Induksi dan Arus Bolak Balik, melalui uraian matematika sederhana serta memperkenalkan contoh pemakaian konsep. *In this course students will learn to understand the basic laws of physics, Electric Field; Electric Potential; Electric current ; Magnetic field; Electromotive Force (EMF) in Induction and Alternating Current, through simple mathematical descriptions and introducing the examples of concept usage.*
Bahan Kajian: Materi pembelajaran ***Course Materials:***	1. Muatan listrik, Hukum Coulomb; 2. Medan listrik: kuat medan listrik, garis gaya, perhitungan kuat medan listrik untuk muatan titik, muatan garis, cincin, piringan, silinder; 3. Hukum Gauss: fluks, garis gaya, Hukum Gauss dan aplikasinya untuk muatan silinder dan bola; 4. Potensial listrik: energi potensial, beda potensial listrik, hubungan potensial listrik dan medan listrik, perhitungan potensial listrik untuk muatan titik, muatan garis, cincin, piringan, silinder dan bola; 5. Kapasitor: Kapasitansi, perhitungan kapasitansi untuk kapisitor keping sejajar, kapasitor silinder dan kapasitor bola, rangkaian kapasitor seri dan paralel, bahan dielektrik, energi kapasitor; 6. Arus listrik: arus dan gerak muatan, hukum Ohm, resistivitas, resistansi, daya listrik; 7. Rangkaian arus searah: rangkaian resistor seri dan paralel, hukum Kirchoff; 8. Medan magnet: fluks dan induksi magnet, gaya Lorentz, hukum Biot Savard-Ampere, perhitungan medan magnet untuk kawat lurus berarus, cincin, solenoida dan toroida; *9.* GGL Induksi : Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada induktor; 10. Gejala Transien: perhitungan perubahan arus terhadap waktu untuk rangkaian RC dan CL seri; 11. Arus bolak balik: arus bolak-balik dalam resistor, induktor, kapasitor, Impedansi, rangkaian R-L dan R-C untuk seri dan pararel, R-L-C seri, Daya, Resonansi. *1. Electric charge, Coulomb's Law;* *2. Electric field: electric field strength, line of force, calculation of electric field strength for point charges, line of charges, rings, disks, cylinders;* *3. Gauss's Law: flux, line of force, Gauss's Law and its application in cylindrical and spherical charges;* *4. Electric potential: potential energy, potential difference of electricity, correlation between electric potential and electric field, calculation of electric potential for point charges, line of charges, rings, disks, cylinders and spheres;*

	5. *Capacitors: Capacitance, calculations of capacitance for parallel strip capacitors, cylindrical and ball capacitors, series and parallel capacitor circuits, dielectric materials, capacitor energy;* 6. *Electric current: current and motion of charge, Ohm's law, resistivity, resistance, electric power;* 7. *Direct current circuits: series and parallel resistor circuits, Kirchoff's law;* 8. *Magnetic field: magnetic flux and induction, Lorentz's force, Biot Savard-Ampere's law, calculation of magnetic fields for threaded straight wire, rings, solenoids and toroides;* 9. *Induced EMF: Faraday's Law, Lenz's Law, Induced EMF, Self-Inductance and Coupled Inductance; energy in the inductor;* 10. *Transient Phenomenons: calculations of changes in current with time for series RC and CL circuits;* 11. *Alternating current: alternating current in resistors, inductors, capacitors, impedance, R-L and R-C circuits for series and parallel, series R-L-C, Power, Resonance.*
Pustaka ***References***	**Utama / *Main*:** 1. Halliday & Resnic; 'Fundamental of Physics'. John Wiley and Sons, New York, 1987 2. Tim Dosen, "Diktat Fisika II", "Soal-soal Fisika II", Fisika FMIPA-ITS 3. Giancoli, DC., (terj, Yuhilza H), 'Fisika, jilid 2', Ertangga, Jakarta, 2001 **Pendukung / *Supporting*:** 1. Alonso & Finn,"Fundamental University Physics", Addison Wesley Pub Comp Inc,13`.ed, Calf, 1990 2. Tipler, PA,(ted. L Prasetio dan R.W.Adi), "Fisika : untuk Sains dan Teknik, Jilid 2", Erlangga, Jakarta, 1998
Dosen Pengampu ***Lecturers***	ITS Physics Lecturer Team
Matakuliah syarat ***Prerequisite***	-

Mg ke/ *Week*	**Kemampuan akhir tiap tahapan belajar (Sub-CPMK) /**	**Penilaian / *Assessment***	**Bentuk Pembelajaran; Metode Pembelajaran; Penugasan Mahasiswa;**	**Materi Pembelajaran [Pustaka] /**	**Bobot Penilaian**

	Final ability of each learning stage (LLO)	**Indikator /** ***Indicator***	**Kriteria & Teknik /** ***Criteria & Techniques***	**[Estimasi Waktu] /** ***Form of Learning; Learning Method; Student Assignment;*** ***[Estimated Time]***		***Learning Material*** ***[Reference]***	***/Assess-ment Load* (%)**
(1)	**(2)**	**(3)**	**(4)**	**Tatap Muka /** ***In-class* (5)**	**Daring /** ***Online* (6)**	**(7)**	**(8)**
1-3	• Mahasiswa memahami butir-butir penyusun materi serta sifat kelistrikannya, hakekat konduktor dan dielektrik. • Mahasiswa memahami kuat medan listrik berdasarkan gaya Coulomb dan hukum Gauss. • *Students understand particles that composed a matter and it's electrical properties, substantial of conductor and dielectric.* • *Students understand the strength of an electric field based on Coulomb force and Gauss law.*	• Kehadiran • Keaktifan dalam diskusi • Ketepatan dalam menjawab pertanyaan saat diskusi • *Attendance* • *Activeness in discussions* • *Accuracy in answering questions during discussion*	Tidak dijelaskan *Not mentioned*	• Kontrak belajar, • Kuliah Klasikal, • Tanya jawab, • Diskusi, • Tugas [3x2x50''] • Study contracts, • Presentation, • Ask and answers, • Discussion, • Assignment [3x2x50'']	Tidak dijelaskan *Not mentioned*	• Bab I Hukum coulomb dan medan listrik; muatan listrik, Hukum Coulomb; • Medan listrik: kuat medan listrik, garis gaya • perhitungan kuat medan listrik untuk muatan titik, muatan garis, cincin, piringan, silinder; • *Chapter I Coulomb's law and electric fields; electric charge, Coulomb's Law;* • *Electric field: electric field strength, line of force,* • *Calculation of electric field strength for point*	**0**

						charges, line of charges, rings, disks, cylinders;	
4	ASISTENSI 1 *ASSISTANCE 1*			2x50''			**1,67**
5		• Kehadiran • Keaktifan dalam diskusi • Ketepatan dalam menjawab pertanyaan saat diskusi • *Attendence* • *Activeness in discussions* • *Accuracy in answering questions during discussion*		• Kuliah klasikal • Tanya jawab • Latihan soal • Tugas dirumah [2x50''] • *Presentation* • *Ask and answers* • *Exercises* • *Assignment [2x50'']*		• Hukum Gauss: fluks, Hukum Gauss dan aplikasinya • *Gauss's Law: flux, Gauss's Law and its applications*	**0**
6-7	Mahasiswa mampu memahami berbagai bentuk potensial listrik pada konduktor bermuatan.	• Kehadiran • Keaktifan dalam diskusi		• Kuliah klasikal, • Tanya jawab lisan • Diskusi		**Bab II Potensial Listrik;** • Integral garis kuat medan listrik,	**0**

	Students are able to understand various forms of electric potential in charged conductors.	• Ketepatan dalam menjawab pertanyaan saat diskusi • *Attendence* • *Activeness in discussions* • *Accuracy in answering questions during discussion*		• Tugas [2x2x50''] • *Presentation* • *Ask and answers* • *Discussion* • *Assignment [2x50'']*		energi potensial, potensial listrik • Perhitungan potensial listrik (muatan diskrit, cincin bermuatan, bola bermuatan) **Chapter II Electric Potential;** • Integral of lines of electric field, potential energy, electric potential • Calculation of electric potential (discrete charge, charged ring, charged ball)	
8	ASISTENSI 2 *ASSISTANCE 2*			2x50''			**1,67**
9	KUIS 1 *QUIZ 1*	Ketepatan jawaban dalam menyelesaikan soal *Accuracy in answering questions*		2x50''			**20**
10-11	Mahasiswa memahami azas kapasitansi berbagai bentuk kapasitor pada rangkaian kapasitor, seri, paralel dan campuran.	• Kehadiran • Keaktifan dalam diskusi • Ketepatan dalam menjawab		• Diskusi kelompok • Presentasi singkat • Diskusi • Tugas		• Potensial listrik dan perhitungan kapasitor • Dielektrikum dan pergeseran listrik	**0**

	Students understand the capacitance principle of various form of capacitor in capacitor circuits, series, parallel and mixed.	pertanyaan saat diskusi ● *Attendence* ● *Activeness in discussions* ● *Accuracy in answering questions during discussion*		[2x2x50''] ● *Group discussion* ● *Short presentation* ● *Discussion* ● *Assignment [2x2x50'']*		● *Electric potential and capacitor calculations* ● *Dielectric and electrical shift*	
12	ASISTENSI 3 *ASSISTANCE 3*			2X50''			**1,67**
13-14	Mahasiswa memahami rangkaian arus searah, hukum Kirchoff *Students understand direct current circuits, Kirchoff's law*	● Kehadiran ● Keaktifan dalam diskusi ● Ketepatan dalam menjawab pertanyaan saat diskusi ● *Attendence* ● *Activeness in discussions* ● *Accuracy in answering questions during discussion*		● Kuliah klasikal, ● Latihan soal ● Diskusi ● Tugas [2x2x50''] ● *Presentation* ● *Exercises* ● *Discussion* ● *Assignment [2x2x50'']*		**Bab III Arus Listrik** ● Arus Listrik dan kerapatan arus, konduktifitas dan resistifitas, hukum Ohm ● Rangkaian arus searah: Hukum Kirchoff ***Chapter III Electric Current*** ● *Electric current and current density, conductivity and resistivity, Ohm's law*	

						• *Direct current circuits: Kirchoff's law*	
15-16	**EVALUASI TENGAH SEMESTER** ***MID-TERM EXAM***			2x50''			**25**
17-19	Mampu menggunakan rumus gaya medan magnit terhadap arus listrik dan muatan bergerak Mampu menyebutkan peranan magnetisasi dalam material magnetik dan hystensis loop *Able to use the magnetic field force formulas in electric current and moving charges* *Able to mention the role of magnetization in magnetic material and hystensis loop*	• Kehadiran • Keaktifan dalam diskusi • Ketepatan dalam menjawab pertanyaan saat diskusi • *Attendance* • *Activeness in discussions* • *Accuracy in answering questions during discussion*		• Kuliah klasikal, • Latihan soal • Diskusi • Tugas [2x2x50''] • *Presentation* • *Exercises* • *Discussion* • *Assignment [2x2x50'']*		**Bab IV Medan magnet:** • Gaya Magnet, Gerak muatan dalam medan Magnet. • Kumparan dalam medan magnet, Induksi magnet oleh arus listrik. • Perhitungan Induksi Magnet. ***Chapter IV Magnetic Field:*** • *Magnetic Force, motion of charge in magnetic field.* • *Coils in a magnetic field, magnetic induction by electric current.* • *Magnetic Induction Calculations.*	**0**

20	ASISTENSI 4 *ASSISTANCE 4*			2X50''			**1,67**
21-22	Memahami prinsip timbulnya gaya gerak listrik, dan arus dalam resistor, kapasitor dan induktor *Understand the principle of electromotive force emergences, and current in resistors, capacitors and inductors*	• Kehadiran • Keaktifan dalam diskusi • Ketepatan dalam menjawab pertanyaan saat diskusi • *Attendance* • *Activeness in discussions* • *Accuracy in answering questions during discussion*		• Kuliah klasikal, • Diskusi • Tugas [2x2x50''] • *Presentation* • *Discussion* • *Assignment [2x50'']*		**Bab V Gaya Gerak Listrik Induksi.** • Hukum faraday, GGL induksi oleh B konstan pada konduktor, GGL Induksi oleh B yang berubah terhadap waktu. • Induktansi bolak-balik, tenaga magnet yang tersimpan pada induktor dan hukum Lenz. ***Chapter V Induced Electromotive Force.*** • *Faraday's law, induced EMF by constant B in conductor, time varying induced EMF by B.* • *Alternating inductance, magnetic energy stored in the*	**0**

						inductor and Lenz's law.	
23	ASISTENSI 5 *ASSISTANCE 5*			2X50''			**1,67**
24	KUIS *QUIZ*			2X50''			**20**
25-27	Mampu menentukan besar impendansi, besar arus listrik, dan sudut fasa pada rangkaian seri, paralel R-L, R-C, RL-C *Able to determine magnitude of impedance, electric current, and phase angle in series and parallel R-L, R-C, RL-C circuits.*	• Kehadiran • Keaktifan dalam diskusi • Ketepatan dalam menjawab pertanyaan saat diskusi • *Attendance* • *Activeness in discussions* • *Accuracy in answering questions during discussion*		• Diskusi • Tugas [2x2x50''] • *Discussion* • *Assignment [2x50'']*		**Bab VI Arus bolak balik:** • Gejala Transien • Harga Efektif Arus dan Tegangan, arus bolak balik pada resistor, induktor dan kapasitor • rangkaian R-L, R-C, R-L-C, Diagram fasor, impedansi Resonansi. ***Chapter VI Alternating Current:*** • *Transient phenomenon* • *Effective Rates of Current and Voltage, alternating current in resistors,*	**0**

						inductors and capacitors • *R-L, R-C, R-L-C circuits, Phasor diagrams, Resonance impedance.*	
28	ASISTENSI 6 *ASSISTANCE 6*			2X50''			**1,67**
29-32	EVALUASI AKHIR SEMESTER *FINAL-SEMESTER EXAM*						**25**

I. Rencana Asesmen & Evaluasi (RAE) / *Assessment & Evaluation Plan*

	ASSESSMENT & EVALUATION PLAN BACHELOR DEGREE PROGRAM OF BIOMEDICAL ENGINEERING - FTEIC ITS **Course : Probability and Statistics**		**RA&E** Write Doc Code
Kode/*code*: **SF184202**	**Bobot sks/*credits* (T/P): 3/0**	**Rumpun MK: SPKB** ***Course Cluster: SPKB***	Smt: II
OTORISASI ***AUTHORIZATION***	**Penyusun RA & E** ***Compiler A&EP***	**Koordinator RMK** ***Course Cluster Coordinator***	**Ka DEP** ***Head of DEP***

Mg ke/ *Week* (1)	Sub CP-MK / *Lesson Learning Outcomes (LLO)* (2)	Bentuk Asesmen (Penilaian) *Form of Assessment* (3)	Bobot / *Load* (%) (4)
1-3	• Mahasiswa memahami butir-butir penyusun materi serta sifat kelistrikannya, hakekat konduktor dan dielektrik. • Mahasiswa memahami kuat medan listrik berdasarkan gaya Coulomb dan hukum Gauss. • *Students understand particles that composed a matter and it's electrical properties, substantial of*	Tidak ada penilaian *No assessment*	0

	conductor and dielectric. • *Students understand the strength of an electric field based on Coulomb force and Gauss law.*		
4	ASISTENSI 1 *ASSISTANCE 1*	Melakukan percobaan untuk mengukur kuat medan listrik dari suatu kawat lurus *Doing experiment to measure the strength of electric field in a straight wire*	1,67
6-7	Mahasiswa mampu memahami berbagai bentuk potensial listrik pada konduktor bermuatan. *Students are able to understand various forms of electric potential in charged conductors.*	Tidak ada penilaian *No assessment*	0
8	ASISTENSI 2 *ASSISTANCE 2*	Menyelesaikan permasalahan yang berhubungan dengan konduktor bermuatan *Solving problems related to charged conductor*	1,67

9	KUIS 1 *QUIZ 1*	- Menjelaskan hakekat konduktor - Menghitung besarnya kuat medan listrik - Penerapan hukum Coulomb dan Gauss - Menghitung potensial listrik pada konduktor bermuatan - *Explain conductor substantial* - *Calculate the strength of electric field* - *Application of Coulomb's and Gauss's Law* - *Calculate the electric potential of charged conductor*	20
10-11	Mahasiswa memahami azas kapasitansi berbagai bentuk kapasitor pada rangkaian kapasitor, seri, paralel dan campuran. *Students understand the capacitance principle of various form of capacitor in capacitor circuits, series, parallel and mixed.*	Tidak ada penilaian *No assessment*	0
12	ASISTENSI 3 *ASSISTANCE 3*	Melakukan simulasi perancangan rangkaian kapasitor secara seri, paralel dan campuran menggunakan software Proteus atau sejenisnya	1,67

		Doing simulation to design capacitor circuit in series, parallel or mixed circuit using software such as Proteus and so on	
13-14	Mahasiswa memahami rangkaian arus searah, hukum Kirchoff *Students understand direct current circuits, Kirchoff's law*	Tidak ada penilaian *No assessment*	0
15-16	EVALUASI TENGAH SEMESTER *MID-TERM EXAM*	**Tes:** Ujian Tulis/Ujian Daring ***Test:*** *Written exam/Online exam*	25
17-19	Mampu menggunakan rumus gaya medan magnit terhadap arus listrik dan muatan bergerak Mampu menyebutkan peranan magnetisasi dalam material magnetik dan hystensis loop	Tidak ada penilaian *No assessment*	0

	Able to use the magnetic field force formulas in electric current and moving charges *Able to mention the role of magnetization in magnetic material and hystensis loop*		
20	ASISTENSI 4 *ASSISTANCE 4*	Menyelesaikan permasalahan yang berkaitan dengan gaya medan magnet Menyebutkan peranan magnetisasi dalam material magnetik dan hystensis loop *Solving problems related to magnetic field force* *Mention the role of magnetization in magnetic material and hystensis loop*	1,67
21-22	Memahami prinsip timbulnya gaya gerak listrik, dan arus dalam resistor, kapasitor dan induktor *Understand the principle of electromotive force*	Tidak ada penilaian *No assessment*	

	emergences, and current in resistors, capacitors and inductors		
23	ASISTENSI 5 *ASSISTANCE 5*	- Menjelaskan konsep gaya gerak listrik - Menghitung besar arus yang mengalir pada rangkaian resistor, kapasitor, dan induktor - *Explain the concept of electromotive force* - *Calculate the amount of current in resistor, capacitor, and inductor circuit*	1,67
24	KUIS *QUIZ*	- Aplikasi medan magnet - Menghitung besarnya gaya gerak listrik - Menghitung nilai arus pada rangkaian resistor, kapasitor, dan induktor - *Application of magnetic field* - *Calculate the magnitude of electromotive force* - *Calculate amount of current in resistor, capacitor, and inductor circuit*	20
25-27	Mampu menentukan besar impendansi, besar arus listrik, dan sudut fasa pada rangkaian seri, paralel R-L, R-C, RL-C	Tidak ada penilaian *No Assessment*	0

	Able to determine magnitude of impedance, electric current, and phase angle in series and parallel R-L, R-C, RL-C circuits.		
28	ASISTENSI 6 *ASSISTANCE 6*	- Menghitung besarnya impedansi pada rangkaian seri, paralel, dan campuran - Menentukan sudut fasa pada berbagai jenis rangkaian - *Calculate the amount of impedance in series, parallel, and mixed circuit* - *Determine phase angle in various circuit*	1,67
29-31	EVALUASI AKHIR SEMESTER *FINAL-SEMESTER EXAM*	**Tes:** Ujian Tulis/Ujian Daring ***Test:*** *Written exam/Online exam*	25
		Total bobot penilaian ***Total assessment load***	**100%**

Indikator Pencapaian CPL Pada MK / *Indicator of PLO achievement charged to the course*

CPL yang dibebankan pada MK / *PLO charged to the course*	CPMK / *Course Learning Outcome (CLO)*	Minggu ke / *Week*	Bentuk Asesmen / *Form of Assessment*	Bobot / *Load* (%)
CPL-01 / *PLO-01*	CPMK 3 / *CLO 3*	*Week- 5-6*	*Task 1 stage 2*	12
		Week- 8	*Mid Exam Question 2 and 3*	18
	CPMK 4 / *CLO 4*	*Week- 10*	*Task 2*	5
		Week- 16	*Final Exam Question 1 and 2*	16
CPL-03 / *PLO-03*	CPMK 1 / *CLO 1*	*Week- 1*	*Task 1 stage 1*	4
	CPMK 2 / *CLO 2*	*Week- 2*	*Task 1 stage 1*	4
		Week- 8	*Mid Exam Question 1*	12
	CPMK 5 / *CLO 5*	*Week- 12*	*Task 3*	5
		Week- 16	*Final Exam Question 3*	12
	CPMK 6 / *CLO 6*	*Week- 16*	*Final Exam Question 4*	12
				∑ = 100%

No	*Form of Assessment*	*PLO-01*	*PLO-02*	*PLO-03*	*PLO-04*	*PLO-05*	*PLO-06*	*PLO-07*	*PLO-08*	*PLO-09*	*PLO-10*	*PLO-11*	*PLO-12*	*Total*
1	*Task 1*	0.12		0.08										**0.2**
2	*Task 2*	0.05												**0.05**
3	*Task 3*			0.05										**0.05**
4	*Mid Exam*	0.18		0.12										**0.3**
5	*Final Exam*	0.16		0.24										**0.4**
	Total	0.51		0.49										**1**