RPS - BASIC SCIENCE

(*Lesson Plan*)

INSTITUT TEKNOLOGI SEPULUH NOPEMBER
KANTOR PENJAMINAN MUTU
2020

	INSTITUT TEKNOLOGI SEPULUH NOPEMBER		
	RPS Basic Science		
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	2.3.3.3.4		Wakil Rektor 1

LIST OF CONTENT

1. **RPS Fisika Dasar I /** *Semester Study Plan of Basic Physics I*

INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS) FAKULTAS ….. DEPARTEMEN …..					Kode Dokumen *Document code*
RENCANA PEMBELAJARAN SEMESTER *Semester Learning Plan*					
MATA KULIAH (MK) *Course*	KODE *Code*	Rumpun MK *Course cluster*	BOBOT (sks) *Credits*	SEMESTER *Semester*	Tgl Penyusunan *Compilation Date*
Fisika Dasar I *Physics I*	SF184101	SKPB	3	1	1 Januari 2021
OTORISASI / PENGESAHAN *AUTHORIZATION* / *ENDORSEMENT*	Dosen Pengembang RPS *Developer Lecturer of Semester Learning Plan*			Koordinator RMK *Course Cluster Coordinator*	Ka PRODI *Head of Department*
Capaian Pembelajaran	CPL-PRODI yang dibebankan pada MK *PLO Program Charged to The Course*				
	KU1	Menerapkan pemikiran logis, kritis, sistematis, dan inovatif dalam konteks pengembangan atau implementasi ilmu pengetahuan dan/atau teknologi sesuai dengan bidang keahliannya			

Learning Outcomes		Applying logical, critical, systematic, and innovative thinking in the context of developing or implementing science and / or technology in accordance with their field of expertise
	KU2	mampu menunjukkan kinerja mandiri, bermutu, dan terukur; Able to demonstrate independent, quality, and measurable performance
	S9	menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri; Show an attitude of responsibility for work in their field of expertise independently
		Capaian Pembelajaran Mata Kuliah (CPMK) – Bila CP MK sebagai kemampuan pada tiap tahap pembelajaran CP MK = Sub CP MK *Course Learning Outcome (CLO) - If CLO as an ability of each learning stage, then CLO = Lesson Learning Outcome (LLO)*
	CPMK1	mampu menerapkan pemikiran logis, kritis, sistematis, dan inovatif dalam menyelesaikan masalah dan implementasi ilmu fisika I. Applying logical, critical, systematic, and innovative thinking to solve problems and implementing Physics I
	CPMK2	mampu menunjukkan kinerja mandiri, bermutu, dan terukur; able to demonstrate independent, quality, and measurable performance
	CPMK3	menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri; show an attitude of responsibility for work in their field of expertise independently

Peta CPL – CP MK *Map of PLO - CLO*	Tuliskan peta matriks antara CPL dengan CPMK (Sub CP MK) Write out the matrix mapping between PLO and CLO (Sub PLO)

	KU1	KU2	S9
Sub-CPMK1	√		
Sub-CPMK2	√	√	√

Sub-CPMK3	√	√	√	
Sub-CPMK4	√	√	√	
Sub-CPMK5	√	√	√	
Sub-CPMK6	√	√	√	
Sub-CPMK7	√	√	√	
Sub-CPMK8	√	√	√	

Deskripsi Singkat MK *Short Description of Course*	Pada mata kuliah ini mahasiswa akan belajar memahami hukum-hukum dasar fisika, Kinematika partikel; Dinamika partikel; Kerja dan energi; Gerak rotasi ; Getaran dan Mekanika fluida, melalui uraian matematika sederhana serta memperkenalkan contoh pemakaian konsep, dan melakukan analisa materi dalam bentuk praktikum. Praktikum yang dilakukan meliputi:(1)bandul fisis, (2)bandul matematis, (3)konstanta pegas, (4)viskositas cairan, (5)gerak peluru, (6)koefisien gesek, (7) momen inersia. In this course, students will learn to understand the basic laws of physics, particle kinematics; Particle dynamics; Work and energy; Rotational motion; Vibration and fluid mechanics, through simple mathematical descriptions and introducing examples of the use of concepts, and analyzing material in the form of practicum. The practicum includes: (1) physical pendulum, (2) mathematical pendulum, (3) spring constant, (4) liquid viscosity, (5) bullet motion, (6) friction coefficient, (7) moment inertia
Bahan Kajian: Materi pembelajaran *Course Materials:*	Besaran danvektor: Besaran dasar, besaran turunan, satuan, konversi satuan, besaran skalar dan vektor, operasi matematika pada vektor secara geometris dan analitis Kinematika partikel: Pergeseran posisi, kecepatan, percepatan, gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif. Dinamika partikel: Hukum Newton I, II dan III, macam-macam gaya (gaya gravitasi, gaya berat, gaya tegang tali, gaya normal, gaya gesek dan gaya pegas), kesetimbangan gaya, penerapan hukum Newton I,II dan III ; Kerja dan energi: konsep kerja, energi kinetik, energi potensial (gravitasi dan pegas), teorema kerja energi, hukum kekekalan energi mekanik, Impuls dan Momentum: impuls, momentum, tumbukan (elastis dan tidak elastis),; Dinamika rotasi: Pergeseran sudut, kecepatan sudut dan percepatan sudut, momen gaya (torsi), pusat massa,kesetimbangan momen gaya, momen inersia, energi kinetik rotasi, gerak menggelinding, hukum kekekalan energi (translasi dan rotasi) Getaran: gerak harmonis sederhana, energi gerak harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan getaran selaras (sejajar dan tegak lurus);

	Mekanika fluida:tekanan hidrostatika, prinsip Pascal, prinsip Archimedes, tegangan permukaan, persamaan kontinuitas, persamaan Bernoulli,viskositas.
	Quantities and vectors: base quantities, derived quantities, units, units conversion, scalar and vector quantities, mathematical operations on vectors geometrically and analytically
	Particle kinematics: displacement, velocity, acceleration, linear motion, angular motion (parabolic and circular); relative motion.
	Particle dynamics: Newton's Laws I, II and III, various forces (gravitational force, gravity, rope tension, normal force, friction and spring force), force balance, application of Newton's laws I, II and III;
	Work and energy: the concept of work, kinetic energy, potential energy (gravity and spring), work energy theorem, the law of conservation of mechanical energy,
	Impulse and Momentum: impulse, momentum, collision (elastic and inelastic), center of mass;
	Rotational dynamics: Angular displacement, angular velocity and angular acceleration, force moment (torque), force moment equilibrium, moment of inertia, rotational kinetic energy, rolling motion, energy conservation law (translation and rotation)
	Vibration: simple harmonic motion, energy of simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular);
	Fluid mechanics: hydrostatic pressure, Pascal's principle, Archimedes principle, surface tension, continuity equation, Bernoulli's equation, viscosity.
Pustaka *References*	Utama: *Main:*
	1. Sears & Zemanky,"University Physics", Pearson Education, 14thed, USA, 2016 2. Douglas C. Giancoli, 'Physics for Scientists and Engineers, Pearson Education, 4th ed, London, 2014 3. Tim Dosen, " Fisika I", Fisika FMIPA-ITS 4. "Petunjuk Praktikum Fisika Dasar", Fisika, MIPA-ITS
	Pendukung: *Supporting:*
	5. Halliday, Resnic, Jearl Walker; 'Fundamental of Physics'. John Wiley and Sons, 10th ed, New York, 2014
	6. Tipler, PA, 'Physics for Scientists and Engineers ',6th ed, W.H. Freeman and Co, New York, 2008
Dosen Pengampu *Lecturers*	

Matakuliah syarat *Prerequisites*	-

Mg Ke- / *Week*	Kemampuan akhir tiap tahapan belajar (Sub-CPMK)/ *Final ability of each learning stage (LLO)*	Penilaian/ *Assesment*		Bantuk Pembelajaran; Metode Pembelajaran; Penugasan Mahasiswa;/ *Form of Learning; Learning Method; Student Assignment;*		Materi Pembelajaran / *Learning Material*	Bobot Penilaian (%)/ *Assesment Load (%)*
		Indikator/ *Indicator*	Kriteria &Teknik/ *Criteria & Techniques*	Tatap Muka(5)	Daring (6)		
(1)	(2)	(3)	(4)			(7)	(8)
1	Sub-CPMK1: Mampu menjelaskan dan menggunakan besaran, satuan, dan vektor, serta mampu menerapkan operasi matematika pada vektor secara geometris dan analitis untuk menyelesaikan permasalahan vektor. *LLO1:* *Able to explain and use quantities, units and vectors, and be able to apply mathematical operations on vectors geometrically and analytically to solve vector problems.*	Ketepatan menjelaskan besaran fisis dan sistem satuan Ketepatan menjelaskan ciri besaran skalar dan besaran vektor serta menerapkan dan menggunakan aljabar vektor *Accuracy in explaining physical quantities and unit systems* *Accuracy in describing the features of scalar quantities and vector quantities and applies and uses vector algebra*	Kriteria: Menggunakan rubrik analitik dan pedoman penskoran (*Marking Scheme*) Teknik non-test: Meringkas materi kuliah; Teknik test: Tanya jawab lisan Latihan menyelesaikan soal-soal mengenai besaran fisika,	Kuliah: Diskusi, [TM: 1x(2x50")] • Tugas-1: Menyusun ringkasan kuliah dan mengerjakan contoh latihan soal yang diberikan dalam kuliah [PT+BM:(1+1)x(2x60")] Latihan soal Latihan menyelesaikan soal-soal aplikasi besaran fisika, satuan, besaran skalar, besaran vektor serta aljabar vektor [PT+BM:(1+1)x(2x60")]	Kuliah tatap muka maya (Zoom); MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=GtOGurrUPmQ; https://www.youtube.com/watch?v=0na1JdPE_JY; https://www.youtube.com/watch?v=CtysVq9eO-0; https://www.youtube.com/watch?v=xEHZArgLIUo&list=PLyQSN7X0ro23IUORJBSDBH8AUWZ1mQBna&index=4&t=0s; https://www.youtube	Besaran dan vektor: Sistem Satuan Internasional (SI), perubahan satuan, besaran dasar, besaran turunan, vektor dan skalar, komponen vektor, vektor satuan, penambahan vektor, perkalian vektor	10%

			satuan, besaran skalar, besaran vektor serta aljabar vektor (Tugas-1: Problem & Solving) *Criteria:* *Using analytical rubrics and scoring guidelines (Marking Scheme)* *Non-test technique:* *Summarize the lecture material;* *Test technique:* *Oral questions and answers* *Exercises on physical quantities, units, scalar quantities, vector quantities*	*Lectures:* *Discussion,* *[TM: 1x(2x50")]* •*Assignment-1: Compile a lecture summary and work on sample practice questions given in the lecture [PT+BM:(1+1)x(2x60")]* *Exercise* *Exercise on application of physical quantities, vector quantities and vector algebra [PT+BM:(1+1)x(2x60")]*	.com/watch?v=ZAeLlaFxR_o&list=PLyQSN7X0ro23IUORJBSDBH8AUWZ1mQBna&index=5&t=0s; https://www.youtube.com/watch?v=ZCFPNl-Ved4&list=PLyQSN7X0ro23IUORJBSDBH8AUWZ1mQBna&index=6&t=0s Diskusi; [TM: 1x(2x50")] Tugas-1: Menyusun ringkasan kuliah dan mengerjakan contoh latihan soal yang diberikan dalam kuliah[PT+BM:(1+1)x(2x60")] Latihan soal Latihan menyelesaikan soal-soal aplikasi besaran fisika, satuan, besaran skalar, besaran vektor serta aljabar vektor [PT+BM:(1+1)x(2x60")]	*Quantities and vectors: International Systems of Units (SI), unit conversion, base quantities, derived quantities, scalar and vector, vector components, unit vector, vector addition, vector multiplication* Pustaka : *References* Halliday,R.,et all, 2014 Douglas C. Giancoli, 2014 Serway, 2004 Tim Dosen Fisika ITS	

| | | *and vector algebra (Assignment-1: Problem & Solving)* | | *Face-to-Face virtual lectures (Zoom); MyITS-Classroom: Learning resources:* https://www.youtube.com/watch?v=GtOGurrUPmQ; https://www.youtube.com/watch?v=0na1JdPE_JY; https://www.youtube.com/watch?v=CtysVq9eO-0; https://www.youtube.com/watch?v=xEHZArgLlUo&list=PLyQSN7X0ro23IUORJBSDBH8AUWZ1mQBna&index=4&t=0s; https://www.youtube.com/watch?v=ZAeLlaFxR_o&list=PLyQSN7X0ro23IUORJBSDBH8AUWZ1mQBna&index=5&t=0s; https://www.youtube.com/watch?v=ZCFPNl- | | |

					Ved4&list=PLyQSN7X 0ro23IUORJBSDBH8A UWZ1mQBna&index= 6&t=0s *Discussion;* *[TM: 1x(2x50")]* *Assignment-1:* *Compile a lecture summary and work on sample practice questions given in the lecture[PT+BM:(1+1)x (2x60")]* *Excersise* *Exercise on the application of physical quantities, vector quantities and vector algebra* *[PT+BM:(1+1)x(2x60")]*		
2,3	Sub-CPMK2: Mampu mendefinisikanPergeseran posisi, kecepatan, percepatan gerak lurus dan melengkung secara grafis dan matematis serta mendemontrasikannya (P).	Ketepatan menjelaskan prinsip Pergeseran posisi, kecepatan, percepatan Ketepatan menjelaskan prinsip gerak lurus, gerak lengkung (parabola dan meling-kar); gerak relatif	Kriteria: Pedoman Penskoran (*Marking Scheme*) Teknik non-test: Meringkas materi kuliah	Kuliah: Diskusi, [TM: 2x(3x50")] • Kuis-1: Menyelesaikan soal-soal posisi, kecepatan, percepatan Latihan soal: menghitung	Kuliah tatap muka maya; [TM: 2x(3x50")] MyITS-Classroom: Sumber belajar: https://www.youtube .com/watch?v=RIGM aw8gsic;	Kinematika partikel: Pergeseran posisi, kecepatan, percepatan, gerak lurus, gerak lengkung	2%

LLO2: *Be able to define position shift, velocity, straight and curved motion acceleration graphically and mathematically and demonstrate it (P).*	*Accuracy in explaining the principle of displacement, velocity and acceleration* *Accuracy in explaining the principle of linear motion, angular motion (parabolic and circular); relative motion*	Tanya-jawab lisan Menyalin contoh soal Teknik test: Latihan soal *Criteria*: *Scoring guidelines(Marking Scheme)* *Non-test technique:* *Summarize the lecture material Oral questions and answers Transcribe exercise* *Test technique:* *Exercise*	percepatan suatu benda yang dipengaruhi oleh resultan gaya. Latihan soal menguraikan persamaan gerak lurus, gerak lengkung (parabola dan meling-kar); gerak relatif. *[PT+BM:(2+2)x(3x60")]* *Lecture:* *Discussion,* *[TM: 2x(3x50")]* *•Quiz-1: Exeercise on position, speed and acceleration* *Exercise:* *calculate the acceleration of an object which is affected by the resultant of force* *Exercise* *describe equations of linear motion, angular motion (parabola and*	Kuis-1: Daring dg MyITS Classroom; Latihan soal: menghitung posisi, kecepatan dan percepatan benda berdasar komponen vektor . Latihan soal menguraikan persamaan gerak lurus, gerak lengkung (paraboladan meling-kar); gerak relatif. *[PT+BM:(2+2)x(3x60")]* *Face-to-face virtual lectures;* *[TM: 2x(3x50")]* *MyITS-Classroom:* *Learning resources:* https://www.youtube.com/watch?v=RIGMaw8gsic; *Quiz-1: Online with MyITS Classroom;*	(paraboladan melingkar); gerak relatif. *Position, speed, acceleration, straight motion, curved motion (parabola and circular); relative motion.*	

					circular); relative motion. *[PT+BM:(2+2)x(3x60")]*	*Exercise: calculate position, speed and acceleration of an object based on vector component.* *Exercise describe equations of linear motion, angular motion (parabola and circular); relative motion.* *[PT+BM:(2+2)x(3x60")]*		
		Ketepatan menghitung penyelesaian soal-soal yang berhubungan. Pergeseran posisi, kecepatan, percepatan, gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif *Accuracy in calculating the problem solutions related to displacement, velocity, acceleration, linear motion, angular motion*	Kriteria: Pedoman Penskoran (*Marking Scheme*) Teknik non-test: Tanya-jawab lisan Menyalin jawaban soal-soal yang dibahas selama perkuliahan Teknik test: Quis 1	Kuliah: Diskusi, [TM: 2x(3x50")] • Kuis-1: Menyelesaikan soal-soal tentang posisi, kecepatan dan percepatan. Latihan soal: Menghitung kecepatan rata – rata dan sesaat, percepatan rata – rata dan sesaat. Latihan soal: Menghitung	Kuliah tatap muka maya; [TM: 2x(3x50")] MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=Po7li9JbEs; Kuis-1: Daring dg MyITS Classroom; Latihan soal: Menghitung kecepatan rata – rata dan sesaat, percepatan rata – rata dan sesaat.	Kinematika partikel: Pergeseran posisi, kecepatan, percepatan, persamaan gerak lurus berubah beraturan, gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif.	7%

| | | *(parabolic and circular); relative motion* | Latihan soal Tugas Rumah

Criteria:
Scoring guidelines (Marking Scheme)

Non-test technique:
Oral questions and answers
Transcribe exercises discussed during lectures

Test technique:
Quiz 1
Exercise
Home assignment | permasalahan gerak lurus beraturan (GLB) dan gerak lurus berubah beraturan (GLBB)

Latihan soal Menghitung gerak lurus, gerak lengkung (parabola dan meling-kar); gerak relatif
[PT+BM:(2+2)x(3x60")]

Lecture:
Discussion,
[TM: 2x(3x50")]
• *Quiz-1: Solve problems about position, velocity and acceleration.*

Exercise:
Calculate average and instantaneous velocity, average and instantaneous acceleration | Latihan soal: Menghitung permasalahan gerak lurus beraturan (GLB) dan gerak lurus berubah beraturan (GLBB)

Latihan soal Menghitung gerak lurus, gerak lengkung (parabola dan meling-kar); gerak relatif

Face-to-face virtual lecture;
[TM: 2x(3x50")]
MyITS-Classroom:
Learning resources:
https://www.youtube.com/watch?v=Po7li9JbEs;
Quiz-1: Online with MyITS Classroom;

Exercise:
Calculate the average and instantaneous velocity, average and | *Particle kinematics: Displacement, velocity, acceleration, uniformly accelerated motion equation, linear motion, angular rotation (parabolic and circular); relative motion* | |

			Exercise Calculating the problem of uniform motion (GLB) and uniformly accelerated motion (GLBB) *Exercise Calculate linear motion, angular motion (parabolic and circular); relative motion* [PT+BM:(2+2)x(3x60")]	*instantaneous acceleration* *Exercise:Calculating the problem of uniform motion (GLB) and uniformly accelerated motion (GLBB)* *Exercise Calculate linear motion, angular motion (parabolic and circular); relative motion*		
Praktikum Sub-CPMK3: Mampu menggunakan konsep dan teori pergeseran posisi, kecepatan, percepatan gerak lurus dan melengkung sertamendemontrasikannya (M-4) *Practicum* *LLO3: Able to use the concepts and theories of displacement, velocity, linear and angular*	Ketepatan menghitung dan mendemonstrasikan pergeseran posisi, kecepatan, percepatan *Accuracy in calculating and demonstrating displacement, velocity and acceleration.*	Kriteria: Rubrik Modul praktikum Fisika Dasar 1 Teknik non-test: Praktikum di dampingi oleh asisten lab. Mencatat Data hasil praktikum, acc asisten. Teknik test:	Praktikum: Modul M-..: Gerak, kecepatan dan percepatan 7 jam: Tutorial / Pre-test, Persiapan, Pelaksanaan Praktikum, Penyusunan laporan, Presentasi hasil. *Practicum:*	Mengakses demonstrasi praktimum secara real time yang dilakukan oleh asisten, melalui live streaming Melakukan praktikum Mandiri Menggunakan program animasi yang telah disiapkan oleh TIM ITS		5%

acceleration and demonstrate it (M-4)		Tes pendahuluan lisan. Laporan akhir presentasi *Criteria: Rubric Physics 1 Practicum module Non-test technique: Practicum assisted by laboratory assistant Record data on practicum results, acc assistant Test technique: Oral preliminary test Final report Presentation*	*Module week - : Motion, velocity and acceleration 7 hours: Tutorial / Pre-test, Preparation, Practicum implementation, Report preparation, Result presentation.*	*Accessing real-time practicum demonstration by the assistant through live streaming Doing practicum independently using animation programs prepared by ITS Team*		
Asistensi Sub-CPMK3: Mampu menggunakan konsep dan	Ketepatan menghitung penyelesaian soal-soal yang berhubungan	Kriteria: Pedoman Penskoran	Pembahasan soal – soal terkait posisi, kecepatan,	Kuliah oleh asisten melalui tatap muka maya;	Kinematika partikel: Pergeseran	2%

teori pergeseran posisi, kecepatan, percepatangerak lurus dan melengkung sertamendemontrasikannya (P). *Assistance* *LLO3*: *Able to use the concepts and theories of displacement, velocity, linear and angular acceleration and demonstrate it* (P).	dengan posisi, kecepatan, percepatan, gerak lurus, gerak lengkung (parabola dan melingkar); gerak relative *Accuracy in calculating the problem solutions related to position, velocity, acceleration, linear motion, angular motion (parabolic and circular); relative motion*	(*Marking Scheme*) Teknik non-test: Tanya-jawab lisan Menyalin jawaban soal-soal yang dibahas oleh asisten selama perkuliahan. Teknik test: Keaktifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten *Criteria*: *Scoring guidelines*(*Marking Scheme*) *Non-test technique:*	percepatan, gerak lurus, gerak lengkung (parabola dan meling-kar); gerak relatif Diskusi, [TM: 1x(3x50")] *Discussing questions related toposition, velocity, acceleration, linear motion, angular motion (parabolic and circular); relative motion* Discussion, *[TM: 1x(3x50")]*	Pembahasan soal melalui myITS Classroom, group Wa, Line, dll. [TM: 1x(3x50")] MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=Po7li9JbEs; *Face-to-face virtual lecture by the assistant;* *Discussing questions through myITS Classroom, Wa group, Line, dll.* *[TM: 1x(3x50")]* *MyITS-Classroom:* *Learning resources:* https://www.youtube.com/watch?v=Po7li9JbEs;	posisi, kecepatan, percepatan, persamaan gerak lurus berubah beraturan, gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif. *Particle kinematics:* *Displacement, velocity,acceleration,uniformly accelerated motion equation, linear motion, angular rotation (parabolic and circular);*

			Oral questions and answers Transcribe exercises discussed with the assistant during lectures *Test technique: Originality and accuracy of answering questions asked by the assistant*			*relative motion*	
4,5	Sub-CPMK3: Mampu menggunakan konsep dan teori Newton I, II, dan III untuk menguraikan gaya-gaya pada berbagai sistem benda, serta mendemontrasikannya (P). *LLO3:* *Able to use Newton I, II and III concepts and theories to describe forces in various systems of objects, and demonstrate it (P)*	Ketepatan menjelaskan prinsip Hukum Newton I, Hukum Newton II, dan Hukum Newton III Ketepatan menjelaskan prinsip macam-macam gaya (gaya gravitasi, gaya berat, gaya apung, gaya berat, gaya tegangan tali, gaya normal, gaya gesek, gaya pegas). *Accuracy in describing the principles of*	Kriteria: Pedoman Penskoran (*Marking Scheme*) Teknik non-test: Meringkas materi kuliah Tanya-jawab lisan Menyalin contoh soal Teknik test: Latihan soal	Kuliah: Diskusi, [TM: 1x(3x50")] • Kuis-1: Menyelesaikan soal-soal Hukum Newton Latihan soal: menghitung percepatan suatu benda yang dipengaruhi oleh resultan gaya. Latihan soal menguraikan komponen-komponen	Kuliah tatap muka maya; [TM: 1x(3x50")] MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=g550H4e5FCY Kuis-1: Daring dg MyITS Classroom; Latihan soal: menghitung percepatan suatu benda yang dipengaruhi oleh resultan gaya.	Dinamika partikel: Hukum Newton I, II dan III, macam-macam gaya (gaya gravitasi, gaya berat, gaya tegang tali, gaya normal, gaya gesek dan gaya pegas), kesetimbanga	2%

		Newton's first, second and third law *Accuracy in describing the principles of various forces (gravitational force, weight force, buoyant force, tension force, normal force, friction force, spring force)*	*Criteria:* *Scoring guidelines (Marking Scheme)* *Non-test technique:* *Summarize the lecture material* *Oral questions and answers* *Transcribe exercise* *Test technique:* *Exercise*	gaya yang dimiliki oleh suatu benda pada bidang horizontal , bidang miring, dan katrol. [PT+BM:(2+2)x(3x60")] *Lecture: Discussion,* *[TM: 1x(3x50")]* • *Quiz-1: Solve problems on Newton's laws* *Exercise calculate the acceleration an object which is affected by the resultant force* *Exercise describes the force components of an object in the horizontal plane, inclined plane and pulley* [PT+BM:(2+2)x(3x60")]	Latihan soal menguraikan komponen-komponen gaya yang dimiliki oleh suatu benda pada bidang horizontal , bidang miring, dan katrol. [PT+BM:(2+2)x(3x60")] *Face-to-face virtual lecture;* *[TM: 1x(3x50")]* *MyITS-Classroom: Learning resources:* https://www.youtube.com/watch?v=g550H4e5FCY *Quiz-1: Online with MyITS Classroom;* *Exercise: calculate the acceleration an object which is affected by the resultant force.* *Exercise describes the force components of an*	n gaya, penerapan hukum Newton I,II dan. *Particle dynamics: Newton's first, second and third law, types of forces (forces (gravitational force, weight force, buoyant force, tension force, normal force, friction force, spring force), equilibrium of forces, Newton's laws application.*

					object in the horizontal plane, inclined plane and pulley [PT+BM:(2+2)x(3x60")]		
		Ketepatan menghitung penyelesaian soal-soal yang berhubungan dengan Hukum Newton I, Hukum Newton II, dan Hukum Newton III *Accuracy in calculating the problem solutions related to Newton's first, second and third law*	Kreteria: Pedoman Penskoran (*Marking Scheme*) Teknik non-test: Tanya-jawab lisan Menyalin jawaban soal-soal yang dibahas selama perkuliahan Teknik test: Quis 1 Latihan soal Tugas Rumah *Criteria*: *Scoring guidelines*	Kuliah: Diskusi, [TM: 2x(3x50")] • Kuis-1: Menyelesaikan soal-soal Hukum Newton Latihan soal: Menghitung kecepatan /gaya gesek benda, pada bidang horizontal karena adanya pengaruh resultan gaya. Latihan soal: Menghitung kecepatan /gaya gesek benda, pada bidang miring karena adanya pengaruh resultan gaya. Latihan soal	Kuliah tatap muka maya; [TM: 2x(3x50")] MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=RDwXQeWWbz0 Kuis-1: Daring dg MyITS Classroom; Latihan soal: Menghitung kecepatan /gaya gesek benda, pada bidang horizontal karena adanya pengaruh resultan gaya. Latihan soal: Menghitung kecepatan /gaya gesek benda, pada bidang miring karena	Dinamika partikel: Hukum Newton I, II dan III, macam-macam gaya (gaya gravitasi, gaya berat, gaya tegang tali, gaya normal, gaya gesek dan gaya pegas), kesetimbangan gaya, penerapan hukum Newton I,II dan.	7 %

| | | | (*Marking Scheme*)

Non-test technique:
Oral questions and answers
Transcribe exercises discussed during lectures

Test technique:
Quiz 1
Exercise
Home assignment | Menghitung tegangan tali pada katrol, akibat adanya gaya berat benda.
[PT+BM:(2+2)x(3x60")]

Lecture:
Discussion,
[TM: 2x(3x50")]
• Quiz-1:
Solve problems on Newton's laws

Exercise:
Calculate velocity/friction force of an object on horizontal plane due to the effect of the resultant force
Exercise:
Calculate velocity/friction force of an object on inclined plane due to the effect of the resultant force | adanya pengaruh resultan gaya.

Latihan soal
Menghitung tegangan tali pada katrol, akibat adanya gaya berat benda.

Face-to-face virtual lecture;
[TM: 2x(3x50")]
MyITS-Classroom:
Learning resources:
https://www.youtube.com/watch?v=RDwXQeWWbz0
Quiz-1: Online with MyITS Classroom;

Exercise:
Calculate velocity/friction force of an object on horizontal plane due to the effect of the resultant force
Exercise:
Calculate velocity/friction force | *Particle dynamics:*
Newton's first, second and third law, types of forces (forces (gravitational force, weight force, buoyant force, tension force, normal force, friction force, spring force), equilibrium of forces, Newton's laws application. | |

					Exercise Calculate the rope tension on the pulley due to the object's weight force [PT+BM:(2+2)x(3x60")]	of an object on inclined plane due to the effect of the resultant force Exercise Calculate the rope tension on the pulley due to the object's weight force		
	Praktikum Sub-CPMK3: Mampu menggunakan konsep dan teori Newton I, II, dan III untuk menyelesaikan masalah gaya-gaya dalam fisika, serta mendemontrasikannya (M-4). Practicum LLO3: Able to use Newton I, II and III concepts and theories to describe forces in various systems of objects, and demonstrate it (M-4).	Ketepatan menghitung dan mendemonstrasikan koefisien gesek statis dan kinetis Accuracy in calculating and demonstrating static and kinetic friction coefficient	Kriteria: Rubrik Modul praktikum Fisika Dasar 1 Teknik non-test: Praktikum di dampingi oleh asisten lab. Mencatat Data hasil praktikum, acc asisten. Teknik non-test: Tes pendahuluan lisan. Laporan akhir Presentasi	Praktikum: Modul M-4: Gaya gesek 7 jam: Tutorial / Pre-test, Persiapan, Pelaksanaan Praktikum, Penyusunan laporan, Presentasi hasil. Practicum: Module week - 4: Friction force 7 hours: Tutorial / Pre-test, Preparation, Practicum implementation, Report preparation, Result presentation.	Mengakses demonstrasi praktimum secara real time yang dilakukan oleh asisten, melalui live streaming Praktikum Mandiri Menggunakan program animasi yang telah disiapkan oleh TIM ITS Accessing real-time practicum demonstration by the assistant through live streaming Doing practicum independently using		5%

			Criteria: Rubric Physics 1 Practicum module Non-test technique: Practicum assisted by laboratory assistant Record data on practicum results, acc assistant Test technique: Oral preliminary test Final report Presentation		animation programs prepared by ITS Team		
	Asistensi Sub-CPMK3: Mampu menggunakan konsep dan teori Newton I, II, dan III untuk menyelesaikan masalah gaya-gaya dalam fisika, serta mendemontrasikannya (P).	Ketepatan menghitung penyelesaian soal-soal yang berhubungan dengan Hukum Newton I, Hukum Newton II, dan Hukum Newton III	Kreteria: Pedoman Penskoran (*Marking Scheme*) Teknik non-test: Tanya-jawab lisan	Pembahasan soal – soal terkait Hukum Newton I, Hukum Newton II, dan Hukum Newton III Diskusi, [TM: 2x(3x50")]	Kuliah oleh asisten melalui tatap muka maya; Pembahasan soal melalui group Wa, Line, dll. [TM: 1x(3x50")] MyITS-Classroom: Sumber belajar:	Dinamika partikel: Hukum Newton I, II dan III, macam-macam gaya (gaya gravitasi, gaya	2%

Assistance *LLO3*: *Able to use Newton I, II and III concepts and theories to describe forces in various systems of objects, and demonstrate it* (P).	*Accuracy in calculating the problem solutions related to Newton's first, second and third law*	Menyalin jawaban soal-soal yang dibahas oleh asisten selama perkuliahan. Teknik test: Keatifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten *Criteria*: *Scoring guidelines* (*Marking Scheme*) *Non-test technique*: *Oral questions and answers* *Transcribe exercises discussed with the assistant during lectures*	*Discussing questions related to Newton's first, second and third law* *Discussion,* *[TM: 2x(3x50")]*	https://www.youtube.com/watch?v=wrhT5xGS-f8 *Face-to-face virtual lecture by the assistant;* *Discussing questions through myITS Classroom, Wa group, Line, dll.* *[TM: 1x(3x50")]* *MyITS-Classroom:* *Learning resources:* https://www.youtube.com/watch?v=wrhT5xGS-f8	berat, gaya tegang tali, gaya normal, gaya gesek dan gaya pegas), kesetimbangan gaya, penerapan hukum Newton I,II dan III. *Particle dynamics:* *Newton's first, second and third law, types of forces (forces (gravitational force, weight force, buoyant force, tension force, normal force, friction force, spring force),*

		Test technique: Originality and accuracy of answering questions asked by the assistant			equilibrium of forces, Newton's laws application.	
6,7	Sub-CP MK-4: Mahasiswa memahami azas kerja dan energi mekanik, hukum kekekalan energi mekanik, impuls, momentum, kekekalan momentum, dan menerapkannya kedalam penyelesaian soal LLO4: *Students understand the principles of work and mechanical energy, the law of conservation of mechanical energy, impulses, momentum, conservation of momentum, and apply them to solving problems*	Ketepatan Menjelaskan kerja dan energi: konsep kerja, energi kinetik, energi potensial (gravitasi dan pegas) (TM 12) *Accuracy in describing work and energy: Ketepatan Menjelaskan kerja dan energi: concept of work, kinetic energy, potential energy (gravity and spring)* (TM 12)	Kriteria: Pedoman Penilaian Teknik non-test: Penjelasan materi kuliah Diskusi dan tanya-jawab Mengerjakan latihan soal bersama-samadi buku tentang konsep kerja dan energi Teknik test: Latihan soal& Tugas Criteria: Scoring guidelines	Kuliah: Diskusi, [TM: 1x(2x50")] • Tugas: Menyelesaikan soal-soal konsep kerja, Energi Potensial Gravitasi dan Energi Potensial Pegas Latihan soal:Menghitung Kerja Oleh Gaya konservatif dan non konsevatif BM:2x(2x60")] Lecture: Discussion, [TM: 1x(2x50")]	Kuliah tatap muka daring (zoom); [TM: 1x(2x50")] MyITS-Classroom: https://www.youtube.com/watch?v=zVRH9d5PW8g Tugas: Daring dg MyITS Classroom; Latihan soal: menghitung kerja oleh gaya konservatif dan non konservatif, menghitung energi kinetik, potensial gravitasi dan potensial pegas BM:2x(2x60")] *Face-to-face virtual lecture (zoom); [TM: 1x(2x50")]*	Kerja dan Energi: Menjelaskan Konsep kerja Energi Kinetik Energi Potensial Gravitasi Energi Potensial Energi Kinetik *Work and Energy: Explain the concept of work kinetic energy potential energy gravity energy kinetic*	3%

			Non-test technique: Explanation of course material Discussions and questions and answers Practice the problems about the concept of work and energy in the book together *Test technique: Exercise & assignment*	• *Assignment: Solve problems on the concept of work, potential gravity energy and potential spring energy* *Exercise: Calculate the work by conservative and nonconservative forces* *BM:2x(2x60")]*	MyITS-Classroom: https://www.youtube.com/watch?v=zVRH9d5PW8g *Assignment: Online with MyITS Classroom; Exercise: Calculate the work by conservative and nonconservative forces, calculate kinetic energy, potential gravity and potential spring BM:2x(2x60")]*	*potential energy* Pustaka: *References:* Halliday,R.,et all, 2014 Douglas C. Giancoli, 2014 Serway, 2004 Tim Dosen Fisika ITS	
		Ketepatan menjelaskan kerja dan energi: teorema kerja energi, hukum kekekalan energi mekanik(TM 13) *Accuracy in describing work and energy; work-energy theorem, the law of conservation of mechanical energy (TM 13)*	Kriteria: Pedoman Penilaian Teknik non-test: Penjelasan materi kuliah Diskusi dan tanya-jawab Mengerjakan latihan soal bersama-samadi buku tentang hukum	Kuliah: Diskusi, [TM: 1x(2x50")] • Tugas: Mengitung tentang hukum kekekalan energi Latihan soal:Mengitung tentang hukum kekekalan energi	Kuliah tatap muka daring (zoom); [TM: 1x(2x50")] MyITS-Classroom:https://www.youtube.com/watch?v=HR5iEX3Sy1k Tugas: Daring dg MyITS Classroom; Latihan soal:Mengitung tentang hukum kekekalan energi	Kerja dan Energi: menjelaskan kerja dan energi: teorema kerja energi, hukum kekekalan energi mekanik	3%

			kekekalan energi Teknik test: Latihan soal& Tugas Criteria: Scoring guidelines Non-test technique: Explanation of course material Discussions and questions and answers Practice the problems about the law of conservation of energy Test technique: Exercise & assignment	[BM:2x(2x60")] Lecture: Discussion, [TM: 1x(2x50")] • Assignment: Calculate the law of conservation of energy Exercise: Calculate the law of conservation of energy BM:2x(2x60")]	[BM:2x(2x60")] Face-to-face virtual lecture (zoom); [TM: 1x(2x50")] MyITS-Classroom: https://www.youtube.com/watch?v=HR5iEX3Sy1k Assignment: Online with MyITS Classroom; Exercise: Calculate law of conservation of energy BM:2x(2x60")]	*Work and Energy: Explain about work and energy; work-energy theorem, the law of conservation of mechanical energy* Pustaka: References: Halliday,R.,et all, 2014 Douglas C. Giancoli, 2014 Serway, 2004 Tim Dosen Fisika ITS	
		Ketepatan menjelaskan Impuls dan Momentum : impuls, momentum,	Kriteria: Pedoman Penilaian	Kuliah: Diskusi, [TM: 1x(2x50")]	Kuliah tatap muka daring (zoom); [TM: 1x(2x50")]	Kerja dan Energi: menjelaskan	3%

		tumbukan (elastis dan tidak elastis), pusat massa;(TM 14) *Accuracy in describing impulse and momentum: impulse, momentum, collision (elastic and inelastic), center of mass; (TM 14)*	Teknik non-test: Penjelasan materi kuliah Diskusi dan tanya-jawab Mengerjakan latihan soal bersama-samadi buku tentang Impuls dan momentum (tumbukan) Teknik test: Latihan soal& Tugas *Criteria: Scoring guidelines Non-test technique: Explanation of course material Discussions and questions and answers Practice the problems*	• Tugas: Menyelesaikan soal-soal impuls dan momentum, tumbukan lenting sempurna, lenting sebagian dan tidak lenting sama sekali Latihan soal:Menghitung impuls dan momentum, kecepatan benda setelah tumbukan lenting sempurna, sebagian dan tidak lenting sama sekali [BM:2x(2x60")] *Lecture: Discussion, [TM: 1x(2x50")]* *Assignment: Solve problems on impulse and momentum, perfectly*	MyITS-Classroom: https://www.youtube.com/watch?v=pHJQTtEEX4M Tugas: Daring dg MyITS Classroom; Latihan soal:Menghitung impuls dan momentum, kecepatan benda setelah tumbukan lenting sempurna, sebagian dan tidak lenting sama sekali [BM:2x(2x60")] *Face-to-face virtual lecture (zoom); [TM: 1x(2x50")]* MyITS-Classroom: https://www.youtube.com/watch?v=pHJQTtEEX4M *Assignment: Online with MyITS Classroom;*	Impuls dan Momentum : impuls, momentum, tumbukan (elastis dan tidak elastis), pusat massa *Work and energy: describing impulse and momentum: impulse, momentum, collision (elastic and inelastic), center of mass* Pustaka: *References:* Halliday,R.,et all, 2014 Douglas C. Giancoli, 2014 Serway, 2004	

		impulse and momentum (collision) *Test technique: Exercise & assignment*	*elastic collision, inelastic collision and perfectly inelastic collision* *Exercise: Calculate impulse and momentum, object's velocity after perfectly elastic collision inelastic collision and perfectly inelastic collision* *BM:2x(2x60")]*	*Exercise: Calculate impulse and momentum, object's velocity after perfectly elastic collision inelastic collision and perfectly inelastic collision* *BM:2x(2x60")]*	Tim Dosen Fisika ITS	
	Asistensi (3) Sub-CP MK-3: Mahasiswa memahami azas kerja dan energi mekanik, hukum kekekalan energi mekanik impuls, momentum, kekekalan momentum, dan menerapkannya kedalam penyelesaian soal *Assistance (3)*	Ketepatan dalam meyelesaikan dan menghitung soal-soal tentang kosep kerja dan energi, impuls dan mometum(TM 15) *Accuracy in solving and calculating problems about the concept of work and energy, impulse and momentum (TM 15)*	Kriteria: Pedoman Penskoran (*Marking Scheme*) Teknik non-test: Tanya-jawab lisan Menyalin jawaban soal-soal yang dibahas oleh	Pembahasan soal – soal terkait Kerja dan Energi, Impuls dan Momentum Diskusi, [TM: 1x(2x50")] Discussing questions related to work and energy, impulse and momentum Discussion,	Kuliah oleh asisten melalui tatap muka secara daring; Pembahasan soal melalui zoom, group WA dll [TM: 1x(2x50")] *Face-to-face online lecture by the assistant;*	Kerja dan Energi: Membahas soal-soal terkait Menjelaskan kerja dan energi: konsep kerja, energi kinetik, energi potensial (gravitasi dan	2%

	LLO3:Students understand the principles of work and mechanical energy, the law of conservation of impulse mechanical energy, momentum, conservation of momentum, and apply them to solving problems.		asisten selama perkuliahan. Teknik test: Keaktifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten *Criteria: Scoring guidelines (Marking Scheme)* *Non-test technique: Oral questions and answers Transcribe exercises discussed with the assistant during lectures* *Test technique:*	[TM: 1x(2x50")]	*Discussing questions through zoom, WA group, etc* [TM: 1x(2x50")]	pegas), teorema kerja energi, hukum kekekalan energi mekanik, Impuls dan Momentum, *Work and energy: Discussing questions about Explaining about work and energy; concept of work, kinetic energy, potential energy (gravity and spring), work-energy theorem, the law of conservation*

			Originality and accuracy of answering questions asked by the assistant			*of mechanical energy, impulse and momentum* Pustaka: *References:* Halliday,R.,et all, 2014 Douglas C. Giancoli, 2014 Serway, 2004 Tim Dosen Fisika ITS	
8	EVALUASI TENGAH SEMESTER / *MIDTERM EXAM*						
9,10	Sub-CPMK5: Mahasiswa mampu memahami konsep benda pejal, menghitung momen inersia, torsi, serta mendemontrasikannya (P). Mahasiswa mampu menggunakan konsep dan teori, dan hukum kekekalan energi untuk menyelesaikan masalah-masalah dinamika rotasi pada sistem katrol, gerak menggelinding, kekekalan momentum sudut	Ketepatan menjelaskan konsep dan teori dinamika rotasi, pusat massa, dan momen inersia, serta penggunaannya Ketepatan menerapkan prinsip benda tegar dan gerak menggelinding dalam penyelesaian soal-soal dinamika rotasi	Kriteria: Menggunakan rubrik analitik dan pedoman penskoran (*Marking Scheme*) Teknik non-test: Meringkas materi kuliah; Teknik test:	Kuliah: Diskusi, [TM: 1x(3x50")] • Tugas-5: Menyusun ringkasan kuliah dan menghitung penyelesaian soal dinamika rotasi dengan kasus dalam fisika. [PT+BM:(1+1)x(3x60")] Latihan soal	Kuliah tatap muka maya (Zoom); MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=fDJeVR0o_w Diskusi; [TM: 1x(3x50")] Tugas-1: Menyusun ringkasan kuliah dan menghitung penyeleaian soal dinamika rotasi	Dinamika rotasi: Pergeseran sudut, kecepatan sudut dan percepatan sudut, momen gaya (torsi), pusat massa, kesetimbangan momen gaya, momen	12%

	LLO5: *Students are able to understand the concept of solid objects, calculate the moment of inertia, torque, and demonstrate it (P)* *Students are able to use concepts and theories, and the law of conservation of energy to solve problems of rotational dynamics in pulley systems, rolling motion, conservation of angular momentum*	*Accuracy in describing the concept and theory of rotational dynamics, centre of mass and moment of inertia, as well as the application* *Accuracy in applying the principles of rigid body and rolling motion in solving rotational dynamics problems*	Tanya jawab lisan Latihan menyelesaikan soal-soal dinamika rotasi dan aplikasinya (Tugas-5: Problem & Solving) *Criteria:* *Using analytic rubric and scoring guidelines (Marking Scheme)* *Non-test technique:* *Summarize the lecture material* *Test technique:* *Oral questions and answers* *Exercises on rotational*	Latihan menyelesaikan soal-soal dinamika rotasi [PT+BM:(1+1)x(3x60")] *Lectures:* *Discussion,* *[TM: 1x(3x50")]* •*Assignment-5:* *Compile a lecture summary and calculate the solutions of rotational dynamics problems with cases in physics.* *[PT+BM:(1+1)x(2x60")]* *Exercise* *Exercise on rotational dynamics* *[PT+BM:(1+1)x(2x60")]*	dengan kasus dalam fisika.[PT+BM:(1+1)x(3x60")] Latihan soal Latihan menyelesaikan soal-soal dinamika rotasi [PT+BM:(1+1)x(3x60")] *Face-to-Face virtual lectures (Zoom);* *MyITS-Classroom: Learning resources:* https://www.youtube.com/watch?v=fDJeVR0o_w *Discussion;* [TM: 1x(3x50")] Assignment-1: *Compile a lecture summary and calculate the solutions of rotational dynamics problems with cases in physics.* [PT+BM:(1+1)x(3x60")]	inersia, energi kinetik rotasi, gerak menggelinding, hukum kekekalan energi (translasi dan rotasi) *Rotational dynamics:* *Angular displacement, angular velocity and angular acceleration, moment of force (torque), centre of mass, balance of force moment, moment of inertia,*

		dynamics and its application (Assignment-5: Problem & Solving)			*Exercise* *Exercise on rotational dynamics* [PT+BM:(1+1)x(3x60")]	*rotational kinetic energy, rolling motion, energy conservation law (translation and rotation)*	
	5%	Ketepatan menghitung dan mendemonstrasikan dinamika rotasi *Accuracy in calculating and demonstrating rotational dynamics*	Kriteria: Menggunakan rubrik holistik Teknik non-test: Menyusun tahapan metode praktikum M5 (Momen Inersia) Praktikum M5 (Momen inersia) yang di dampingi oleh asisten laboratorium Fisika Dasar. Mencatat data hasil praktikum sesuai dengan variabel yang dijelaskan oleh asisten.	Praktikum: Modul-5 (M5): Momen Inersia, 7 jam: Tutorial/ Pre-test, Persiapan, Pelaksanaan Praktikum, Penyusunan laporan, Presentasi hasil. *Practicum: Module-5 (M%): Moment of inertia, 7 hours: Tutorial / Pre-test, Preparation, Practicum implementation, Report preparation, Result presentation.*	Praktikum Mandiri Memanfaatkan virtual laboratory untuk mempelajari konsep gerak rotasi dari suatu benda, sebagai contohnya penggunaanaplikasi PhET (https://phet.colorado.edu/ *Independent Practicum Use virtual laboratory to learn the concept of rotational motion of an object, for example using PhET application*(https://phet.colorado.edu/	Pustaka: *References:* Halliday,R.,et all, 2014 Douglas C. Giancoli, 2014 Serway, 2004 Tim Dosen Fisika ITS	5%

			Teknik test: Tes pendahuluan lisan. Membuat laporan akhir Presentasi hasil *Criteria:* *Using holistic rubric* *Non-test technique:* *Arranging the stages of practicum method M5 (Moment of Inertia)* *Practicum M5 (Moment of inertia) assisted by the Physics laboratory assistant.* *Record data on practicum results*				

			according to the variables explained by the assistant			
	Asisten *Assistance*	Ketepatan menghitung penyelesaian soal-soal dinamika rotasi melalui asistensi *Accuracy in calculating the solutions of rotational dynamics problems through assistance*	Kriteria: Menggunakan rubrik analitik dan pedoman penskoran (*Marking Scheme*) Teknik non-test: Tanya-jawab lisan Latihan soal yang dibahas dengan asisten Teknik test: Keaktifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten *Criteria:*	Diskusi, [TM: 1x(3x50")] • Latihan soal Latihan dan pembahasan penyelesaian soal-soal dinamika rotasi [PT+BM:(1+1)x(3x60")] *Discussion, [TM: 1x(3x50")]* • *Exercise Exercise and discussing the solution of rotational dynamics problems [PT+BM:(1+1)x(3x60")]*	Kuliah dengan asisten melalui tatap muka maya (Zoom); Diskusi Online (Chatting) pembahasan soal melalui email, group WA, Line, dll. [TM: 1x(3x50")] Latihan soal Latihan dan pembahasan penyelesaian soal-soal dinamika rotasi[PT+BM:(1+1)x(3x60")] *Face-to-face virtual lecture with the assistant (Zoom);* Online discussion (Chatting) on solving problems by email, WA group, Line, etc[TM: 1x(3x50")]	4

			Using analytic rubric and scoring guidelines(Marking Scheme)		Exercise *Exercise and discussing the solution of rotational dynamics problems* [PT+BM:(1+1)x(3x60")]		
			Non-test technique: *Oral questions and answers* *Discuss exercise with the assistant*				
			Test technique: Originality and accuracy of answering questions asked by the assistant				
11,12	Sub-CPMK 6:Mahasiswa memahami dan mampu menerapkan konsep gerak harmonis sederhana, energi gerak harmonis sederhana, bandul matematis, bandul fisis, bandul punter dan mampu mendemonstrasikannya,	Ketepatan dalam menerangkan secara tulisan dan verbal dengan tepat terhadap konsep energi pada gerak harmonis sederhana, bandul matematis, bandul fisis, bandul puntir,	Kriteria: Menggunakan rubrik analitik dan pedoman penskoran (*Marking Scheme*) Teknik non-test:	Kuliah: Diskusi, [TM: 1x(2x50")] • Tugas-1: Menyusun ringkasan kuliah dan mengerjakan contoh latihan soal yang diberikan dalam kuliah	Kuliah tatap muka maya (Zoom); MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=pKKfmthLNmQ	Getaran:harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan	12

serta mampu menghitung gabungan getaran selaras(sejajar dan tegak lurus) *LLO6:* *Students understand and are able to apply the concept of simple harmonic motion, simple harmonic motion energy, mathematical pendulum, physical pendulum, punter pendulum and are able to demonstrate them, and are able to calculate the combination of harmonious vibrations (parallel and perpendicular)*	gabungan getaran selaras (sejajar dan tegak lurus) Kemampuan memberikan contoh penerapan konsep harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan getaran selaras (sejajar dan tegak lurus) dalam kehidupan sehari-hari *Accuracy in describing in writing and verbally concept of energy in simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular)* *Ability to provide examples on the application of the concept of simple*	Meringkas materi kuliah; Memberikan ide sederhana aplikasi Teknik test: Tanya jawab lisan Latihan menyelesaikan soal-soal mengenai harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan getaran selaras (sejajar dan tegak lurus) (Tugas-1: Problem & Solving) *Criteria:*	[PT+BM:(1+1)x(2x60")] Latihan soal menyelesaikan soal-soal aplikasi harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan getaran selaras (sejajar dan tegak lurus)[PT+BM:(1+1)x(2x60")] *Lecture:* *Discussion,* *[TM: 1x(2x50")]* • *Assignment-1: Summarize the lecture material and working on sample practice questions given in lecture[PT+BM:(1+1)x(2x60")]* *Exercise* *Exercises on simple harmonic motion, mathematical pendulum, physical*	https://www.youtube.com/watch?v=aMas-Z8K2-I https://www.youtube.com/watch?v=_o0_IJCnMQE https://www.youtube.com/watch?v=NN--nwtXrsw https://www.youtube.com/watch?v=X6Hz0rPzxvc https://www.youtube.com/watch?v=cj4XTyW6ums Diskusi; [TM: 1x(2x50")] Tugas-1: Menyusun ringkasan kuliah dan mengerjakan contoh latihan soal yang diberikan dalam kuliah[PT+BM:(1+1)x(2x60")] Latihan soalmenyelesaikan soal-soal aplikasi harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan getaran selaras (	getaran selaras(sejajar dan tegak lurus) *Vibrations:* *simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular)* Pustaka: *References:* Halliday,R.,et all, 2014 Douglas C. Giancoli, 2014

		harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular) in everyday life.	*Using analytic rubric and scoring guidelines (Marking Scheme)* *Non-test technique: Summarize the lecture material Provide simple application idea* *Test technique: Oral questions and answers Exercises on simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations*	*pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular)[PT+BM :(1+1)x(2x60")]*	sejajar dan tegak lurus)[PT+BM:(1+1)x(2x60")] *Face-to-face virtual lecture (Zoom); MyITS-Classroom: Learning resources:* https://www.youtube .com/watch?v=pKKfm thLNmQ https://www.youtube .com/watch?v=aMas-Z8K2-I https://www.youtube .com/watch?v=_o0_IJ CnMQE https://www.youtube.co m/watch?v=NN--nwtXrsw https://www.youtube.co m/watch?v=X6Hz0rPzxvc https://www.youtube.co m/watch?v=cj4XTyW6u ms *Discussion,* [TM: 1x(2x50")] • *Assignment-1: Summarize the lecture material and working*	Serway, 2004 Tim Dosen Fisika ITS	

		(parallel and perpendicular) (Assignment-1: Problem &Solving)		on sample practice questions given in lecture[PT+BM:(1+1)x(2x60")] *Exercise Exercises on simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular)[PT+BM:(1+1)x(2x60")]*		
Praktikum Mampu menggunakan getaran, hukum Hooke pada konsep bandul matematis dan bandul fisis. *Practicum Able to use vibrations, Hooke law on the concepts of mathematical and physical pendulum.*	Ketepatan menghitung dan mendemonstrasikan terkait perbedaan sistem bandul matematis dan bandul fisis. *Accuracy in calculating and demonstrating differences between*	Kriteria: Rubrik Modul praktikum Fisika Dasar 1 Teknik non-test: Praktikum di dampingi oleh asisten lab. Mencatat Data hasil praktikum, acc asisten. Teknik non-test:	Praktikum: ModulG1 dan G2 : Bandul matematis dan Bandul Fisis 7 jam: Tutorial / Pre-test, Persiapan, Pelaksanaan Praktikum, Penyusunan laporan, Presentasi hasil. *Practicum:*	Praktikum Mandiri Menggunakan program animasi yang telah disiapkan oleh TIM ITS *Independent practicum using animation programs prepared by ITS Team*		5%

	mathematical and physical pendulum.	Tes pendahuluan lesan. Laporan akhir Presentasi *Criteria:* *Rubric* *Physics 1* *Practicum module* *Non-test technique:* *Practicum assisted by laboratory assistant* *Record data on practicum results, acc assistant* *Test technique:* *Oral preliminary test* *Final report* *Presentation*	*Module G1 and G : Mathematical and physical pendulum 7 hours: Tutorial / Pre-test, Preparation, Practicum implementation, Report preparation, Result presentation.*			
	Asistensi mampu menerapkan konsep gerak harmonis	Ketepatan menghitung penyelesaian soal-soal berkenaan dengan	Kriteria: Pedoman Penskoran	Pembahasan soal – soal berkenaan energi osilasi dan gabungan	Pembahasan soal – soal tatap maya (Zoom, melalui group		3%

sederhana, energi gerak harmonis sederhana, bandul matematis, bandul fisis, bandul puntir serta mampu menghitung gabungan getaran selaras (sejajar dan tegak lurus) *Assistance* *able to apply the concept of simple harmonic motion, simple harmonic motion energy, mathematical pendulum, physical pendulum, torsional pendulum and able to calculate combined harmonious vibrations (parallel and perpendicular)*	konsep gabungan dua getaran selaras dan tegak lurus. *Accuracy in calculating the problem solutions related to the concept of combining two harmonious and perpendicular motion.*	(*Marking Scheme*) Teknik non-tes: Tanya-jawab lisan Menyalin jawaban soal-soal yang dibahas oleh asisten selama perkuliahan. Teknik tes: Keatifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten *Criteria*: *Scoring guidelines* (*Marking Scheme*) *Non-test technique:*	dua getaran baik selaras maupun tegak lurus. Diskusi, [TM: 1x(3x50")] *Discussing questions related to oscillation energy and combination of two vibrations both harmonious and perpendicular Discussion,* *[TM: 1x(3x50")]*	WA, LINE, dll.) berkenaandengan energi osilasi dan gabungan dua getaran [TM: 1x(3x50")] MyITS-Classroom: Sumber belajar: *Discussing questions virtually (Zoom, through WA group, Line, etc) about oscillation energy and combination of two vibrations* *[TM: 1x(3x50")]* MyITS-Classroom: *Learning resources:*		

			Oral questions and answers *Transcribe exercises discussed with the assistant during lectures* *Test technique: Originality and accuracy of answering questions asked by the assistant*				
13,14	Sub-CPMK7: Mampu menggunakan konsep elastisitas, teori hidrostatis yang meliputi:tekanan hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan dan Kapilaritas. Mampu menggunakan konsep hidrodinamika yang meliputi: persamaan kontinyuitas dan Bernoulli. *LLO7: Able to use the concept of elasticity, hydrostatic*	Ketepatan menjelaskan tentang konsep elastisitas, teori hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan dan Kapilaritas Ketepatan menghitung penyelesaian soal-soal berkenaan dengan elastisitas,hidrostatis, prinsip Pascal, Archimedes, dan Tegangan Permukaan Ketepatan menghitung dan	Kriteria: Pedoman Penskoran (*Marking Scheme*) Teknik non-tes: Meringkas materi kuliah Tanya-jawab lisan Menyalin contoh soal Teknik tes: Latihan soal	Kuliah: Diskusi, [TM: 1mgx(3sksx50")] • Tugas: Menyusun ringkasan kuliah dan menghitung berhubungan dengan elastisitas, teori hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan dan Kapilaritas [PT+BM:(1+1)x(3x50")]	Kuliah tatap muka maya (Zoom); Diskusi; [TM: 1x(3x50")] Tugas: Menyusun ringkasan kuliah dan menghitung berkenaan teori elastisitas, hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan, dan Kapilaritas [PT+BM:(1+1)x(3x50")]	Mekanika fluida: elastisitas, tekanan hidrostatika, prinsip Pascal, prinsip Archimedes, tegangan permukaan dan kapilaritas *Fluid mechanics:el*	5 %

theory which includes: hydrostatic pressure, Pascal's principle, Archimedes, Surface Tension and Capillary. Able to use hydrodynamic concepts which include: continuity and Bernoulli equations	mendemonstrasikan viskositas cairan *Accuracy in explaining the concept of elasticity, hydrostatic theory, Pascal principle, Archimedes, surface tension and capillarity* *Accuracy in calculating the problems solutions related to elasticity, hydrostatic theory, Pascal principle, Archimedes, and surface tension* *Accuracy in calculating and demonstrating fluid viscosity*	Kriteria: Rubrik Modul praktikum Fisika Dasar 1 Teknik non-tes: Praktikum di dampingi oleh asisten lab. Mencatat Data hasil praktikum, acc asisten. Teknik non-tes: Tes pendahuluan lisan. Laporan akhir Presentasi *Criteria:* *Scoring guidelines (Marking Scheme)* *Non-test technique:*	Modul: Viskositas cairan 7 jam: Tutorial / Pre-tes, Persiapan, Pelaksanaan Praktikum, Penyusunan laporan, Presentasi hasil. *Lecture:* *Discussion,* *[TM: 1mgx(3sksx50")]* • *Assignment: Compile a lecture summary and doing calculation related to elasticity, hydrostatic theory, Pascal principle, Archimedes, surface tension and capillarity* *[PT+BM:(1+1)x(3x50")]* *Modul: Fluid viscosity* *7 hours: Tutorial / Pre-test, Preparation, Practicum implementation,*	Praktikum Mandiri Menggunakan program animasi tentang viskositas cairan yang telah disiapkan oleh TIM ITS *Face-to-face virtual lecture (Zoom);* *Discussion;* *[TM: 1x(3x50")]* *Assignment: Compile a lecture summary and doing calculation related to elasticity, hydrostatic, Pascal principle, Archimedes, surface tension and capillarity* *[PT+BM:(1+1)x(3x50")]* *Independent practicum using animation programs about viscosity prepared by ITS Team*	*asticity, hydrostatic pressure, Pascal principle, Archimedes, surface tension and capillarity*

			Summarize the lecture material Oral questions and answers Transcribe exercise	*Report preparation, Result presentation.*			
			Test technique: Exercise				
			Criteria: Rubric Physics 1 Practicum module Non-test technique: Practicum assisted by laboratory assistant Record data on practicum results, acc assistant Test technique: Oral preliminary test Final report Presentation				

Asistensi Mampu menggunakan konsep dan teori hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan, Bernoulli dalam menyelesaikan masalah-masalah mekanika fluida

Assistance Able to use hydrostatic concept and theory, Pascal's principle, Archimedes, Bernoulli in solving fluid mechanics problems | Ketepatan menghitung penyelesaian soal-soal berkenaan dengan konsep dan teori hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan, Bernoulli

Accuracy in calculating the problem solutions related to hydrostatic concept and theory, Pascal's principle, Archimedes, Bernoulli | Kriteria: Pedoman Penskoran (Marking Scheme)

Teknik non-tes: Tanya-jawab lisan Menyalin jawaban soal-soal yang dibahas oleh asisten selama perkuliahan.

Teknik tes: Keatifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten

Criteria: Scoring guidelines(Marking Scheme) | Pembahasan soal – soal berkenaan teori elastisitas, hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan, Bernoulli dalam menyelesaikan masalah-masalah mekanika fluida Diskusi, [TM: 1x(3x50")]

Discussing questions related toelasticity theory, hydrostatic, Pascal's principle, Archimedes, Surface Tension, Bernoulli in solving fluid mechanics problems Discussion, [TM: 1x(3x50")] | Pembahasan soal – soal tatap maya (Zoom, melalui group WA, LINE, dll.) berkenaandengan teori hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan, Bernoulli dalam menyelesaikan masalah-masalah mekanika fluida [TM: 1x(3x50")] MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=UJ3-Zm1wbIQ

Discussing questions virtually (Zoom, through WA group, Line, etc) about hydrostatic concept and theory, Pascal's principle, Archimedes, Bernoulli in solving fluid | Mekanika fluida: elastisitas, tekanan hidrostatika, prinsip Pascal, prinsip Archimedes, tegangan permukaan, persamaan kontinuitas, persamaan Bernoulli, viskositas

Fluid mechanics:elasticity, hydrostatic pressure, Pascal principle, Archimedes, surface tension, continuity equation, Bernoulli | 2% |

		Non-test technique: Oral questions and answers Transcribe exercises discussed with the assistant during lectures Test technique: Originality and accuracy of answering questions asked by the assistant		mechanics problems [TM: 1x(3x50")] MyITS-Classroom: Learning resources: https://www.youtube.com/watch?v=UJ3-Zm1wbIQ	equation and viscosity
15,16	EVALUASI AKHIR SEMESTER FINAL EXAM				100 %

Catatan sesuai dengan SN Dikti Permendikbud No 3/2020:

Capaian Pembelajaran Lulusan PRODI (CPL-PRODI) adalah kemampuan yang dimiliki oleh setiap lulusan PRODI yang merupakan internalisasi dari sikap, penguasaan pengetahuan dan ketrampilan sesuai dengan jenjang prodinya yang diperoleh melalui proses pembelajaran.

CPL yang dibebankan pada mata kuliah adalah beberapa capaian pembelajaran lulusan program studi (CPL-PRODI) yang digunakan untuk pembentukan/pengembangan sebuah mata kuliah yang terdiri dari aspek sikap, ketrampulan umum, ketrampilan khusus dan pengetahuan.

CP Mata kuliah (CPMK) adalah kemampuan yang dijabarkan secara spesifik dari CPL yang dibebankan pada mata kuliah, dan bersifat spesifik terhadap bahan kajian atau materi pembelajaran mata kuliah tersebut.

Sub-CP Mata kuliah (Sub-CPMK) adalah kemampuan yang dijabarkan secara spesifik dari CPMK yang dapat diukur atau diamati dan merupakan kemampuan akhir yang direncanakan pada tiap tahap pembelajaran, dan bersifat spesifik terhadap materi pembelajaran mata kuliah tersebut.

Indikator penilaian kemampuan dalam proses maupun hasil belajar mahasiswa adalah pernyataan spesifik dan terukur yang mengidentifikasi kemampuan atau kinerja hasil belajar mahasiswa yang disertai bukti-bukti.

Kreteria Penilaian adalah patokan yang digunakan sebagai ukuran atau tolok ukur ketercapaian pembelajaran dalam penilaian berdasarkan indikator-indikator yang telah ditetapkan. Kreteria penilaian merupakan pedoman bagi penilai agar penilaian konsisten dan tidak bias. Kreteria dapat berupa kuantitatif ataupun kualitatif.

Teknik penilaian: tes dan non-tes.

Bentuk pembelajaran: Kuliah, Responsi, Tutorial, Seminar atau yang setara, Praktikum, Praktik Studio, Praktik Bengkel, Praktik Lapangan, Penelitian, Pengabdian Kepada Masyarakat dan/atau bentuk pembelajaran lain yang setara.

Metode Pembelajaran: *Small Group Discussion*, *Role-Play & Simulation*, *Discovery Learning*, *Self-Directed Learning*, *Cooperative Learning*, *Collaborative Learning*, *Contextual Learning*, *Project Based Learning*, dan metode lainnya yg setara.

Materi Pembelajaran adalah rincian atau uraian dari bahan kajian yg dapat disajikan dalam bentuk beberapa pokok dan sub-pokok bahasan.

Bobot penilaian adalah prosentasi penilaian terhadap setiap pencapaian sub-CPMK yang besarnya proposional dengan tingkat kesulitan pencapaian sub-CPMK tsb., dan totalnya 100%.

TM=Tatap Muka, **PT**=Penugasan Terstuktur, **BM**=Belajar Mandiri.

2. RPS Fisika Dasar II / *Semester Study Plan of Basic Physics II*

INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS) FAKULTAS SAINS dan ANALITIKA DATA DEPARTEMEN FISIKA						Kode Dokumen

RENCANA PEMBELAJARAN SEMESTER Semester Learning Plan							
MATA KULIAH (MK) COURSE	KODE CODE		Rumpun MK Course Cluster	BOBOT (sks) Credits		SEMESTER Semester	Tgl Penyusunan Compilation Date
Fisika II Physics II	SF184202		SPKB	3	3/0	2	10 Desember 2021
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 Learning Outcome	
	KU1	Menerapkan pemikiran logis, kritis, sistematis, dan inovatif dalam konteks pengembangan atau implementasi ilmu pengetahuan dan/atau teknologi sesuai dengan bidang keahliannya Applying logical, critical, systematic, and innovative thinking in the context of developing or implementing science and / or technology in accordance with their field of expertise
	KU2	mampu menunjukkan kinerja mandiri, bermutu, dan terukur;

		able to demonstrate independent, quality, and measurable performance;
	S9	menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri; show an attitude of responsibility for work in their field of expertise independently;

	Capaian Pembelajaran Mata Kuliah (CPMK) / Course Learning Outcome (CLO) Bila CP MK sbg penjabaran kemampuan setiap Tahap Pembelajaran dalam MK maka CPMK = Sub CPMK If CLO as description capability of each Learning Stage in the course, then CLO = Lesson Learning Outcome (LLO)	
	CPMK1 CLO1	mampu menerapkan pemikiran logis, kritis, sistematis, dan inovatif dalam menyelesaikan masalah dan implementasi ilmu fisika I. able to apply logical, critical, systematic, and innovative thinking in solving problems and implementing physics I.
	CPMK2 CLO2	mampu menunjukkan kinerja mandiri, bermutu, dan terukur; able to demonstrate independent, quality, and measurable performance;
	CPMK3 CLO3	menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri; show an attitude of responsibility for work in their field of expertise independently;

Peta CPL – CP MK Map of PLO - CLO	Tuliskan peta matriks antara CPL dengan CPMK (Sub CP MK)

	KU1	KU2	S9
Sub-CPMK1	√		

Sub-CPMK2	√	√	√	
Sub-CPMK3	√	√	√	
Sub-CPMK4	√	√	√	
Sub-CPMK5	√	√	√	
Sub-CPMK6	√	√	√	

Diskripsi Singkat MK	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.
Short Description of Course	In this course, students will learn to understand the basic laws of physics, the Electric Field; Electric Potential; Electric current ; Magnetic field; Electric Motion Force (EMF) Induction and Alternating Current, through simple mathematical descriptions and introducing examples of the use of concepts.
Bahan Kajian: Materi pembelajaran Course Materials:	Gaya 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; Hukum Gauss: fluks, garis gaya, Hukum Gauss dan aplikasinya untuk muatan silinder dan bola; 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; Kapasitor: Kapasitansi, perhitungan kapasitansi untuk kapisitor keping sejajar, kapasitor silinder dan kapasitor bola, rangkaian kapasitor seri dan paralel, bahan dielektrik, energi kapasitor; Arus listrik: Arus dan gerak muatan, hukum Ohm, resistivitas, resistansi, daya listrik; Rangkaian arus searah: rangkaian resistor seri dan paralel, hukum Kirchoff; Medan magnet: fluks dan induksi magnet, gaya Lorentz, hukum Biot Savard-Ampere, perhitungan medan magnet untuk kawat lurus berarus, cincin, solenoida dan toroida; GGL Induksi : Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada induktor; Arus bolakbalik: arus bolak-balik dalam resistor, induktor, kapasitor, Impedansi, rangkaian R-L dan R-C untuk seri dan pararel, R-L-C seri, Daya, Resonansi. Force and Electric field

	Electric charge, Coulomb's Law; Electric field: electric field strength, line force, calculation of electric field strength for point charge, line charge, ring, disk, cylinder; Gauss's Law: flux, lines of force, Gauss's Law and its application to cylindrical and spherical charges; Electric potential: potential energy, electric potential difference, relationship between electric potential and electric field, calculation of electric potential for point charges, line charges, rings, plates, cylinders and spheres; Capacitors: Capacitance, capacitance calculations for strip capacitors, cylindrical and ball capacitors, series and parallel capacitor circuits, dielectric materials, capacitor energy; Electric current: current and motion of charge, Ohm's law, resistivity, resistance, electric power; Direct current circuits: series and parallel resistor circuits, Kirchoff's law; Magnetic fields: magnetic flux and induction, Lorentz forces, Biot Savard-Ampere law, computation of magnetic fields for straight-current wires, rings, solenoids and toroides; Induced EMF: Faraday's Law, Lenz's Law, Induced EMF, Self-Inductance and Coupled Inductance; energy in the inductor; Transient Symptoms: calculation of change in current with time for series RC and CL circuits Alternating current: alternating current in resistors, inductors, capacitors, impedance, R-L and R-C circuits for series and parallel, R-L-C series, Power, Resonance.
Pustaka References	Utama / main: 1. Sears & Zemanky,"University Physics", Pearson Education, 14thed, USA, 2016 2. Douglas C. Giancoli, 'Physics for Scientists and Engineers, Pearson Education, 4th ed, London, 2014 3. Tim Dosen, " Fisika II", Fisika FMIPA-ITS Pendukung/ supporting: 4. Halliday, Resnic, Jearl Walker; 'Fundamental of Physics'. John Wiley and Sons, 10th ed, New York, 2014 5. Tipler, PA, 'Physics for Scientists and Engineers ',6th ed, W.H. Freeman and Co, New York, 2008
Dosen Pengampu Lecturers	

Matakuliah syarat Prerequisite							
Mg ke/ Week	Kemampuan akhir tiap tahapan belajar (Sub-CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assessment		Bentuk Pembelajaran; Metode Pembelajaran; Penugasan Mahasiswa; [Estimasi Waktu] / Form of Learning; Learning Method; Student Assignment; [Estimated Time]		Materi Pembelajaran [Pustaka] / Learning Material [Reference]	Bobot Penilaian /Assess-ment Load (%)
		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques				
(1)	(2)	(3)	(4)	Tatap Muka / In-class (5)	Daring / Online (6)	(7)	(8)
1,2,3	Sub-CPMK1: Mahasiswa memahami butir-butir penyusun materi serta sifat kelistrikannya, hakekat konduktor dan dielektrik. Sub-CPMK2:Mahasiswa Memahami kuat medan listrik berdasarkan gaya coulomb dan hukum gauss LLO1: Students understand the constituent points of the material as well as its electrical properties, the nature of conductors and dielectrics.	Mampu menghitung gaya Coulomb Mampu menghitung medan listrik sistem diskrit Mampu menghitung medan listrik sistem diskrit Mampu mengguna-kan hukum Gauss Be able to calculate Coulomb force Able to calculate the electric field of a discrete system Able to calculate the electric field of a discrete system	Kriteria: Menggunakan rubrik analitik dan pedoman penskoran (Marking Scheme) Teknik non-test: Meringkas materi kuliah; Teknik test: Criteria: Using analytical rubrics and scoring guidelines	Kuliah: Diskusi, [TM: 1mgx(3sksx50")] • Tugas-1: Menyusun ringkasan kuliah dan mengerjakan contoh latihan soal yang diberikan dalam kuliah [PT+BM:(1+1)x(2x60")] Latihan soaldan Asistensi Latihan menyelesaikan soal. [TM: 1mgx(1sksx50")] • Lectures:	Kuliah tatap muka maya (Zoom); MyITS-Classroom: Sumber belajar: Diskusi; [TM: 1mgx(3sksx50")] Tugas-1: Menyusun ringkasan kuliah dan mengerjakan contoh latihan soal yang diberikan dalam kuliah Face-to-face virtual lectures (Zoom); • MyITS-Classroom: Learning Resources:	Bab 1: Hukum Coulomb dan medan listrik (Ref.Utama no.2) Chapter 1: Coulomb's laws and electric fields (Main ref. 2)	15%

	LLO2: Students Understand electric field strength based on coulomb force and Gauss law	Able to use Gauss's law	(Marking Scheme) Non-test technique: • Summarize the lecture material; Test technique:	• Discussion, [TM: 1weekx (3sksx50")] • Task-1: Compile a lecture summary and work on sample practice questions given in the lecture [PT + BM: (1 + 1) x (2x60")] • Exercise questions and assistance Practice solving problems. [TM: 1weekx (1sksx50")]	• Discussion; [TM: 1weekx(3sksx50")] • Task-1: Compile a lecture summary and work on sample practice questions given in the lecture		
4,5	Sub-CPMK3: Mahasiswa mampu memahami berbagai bentuk potensial listrik pada konduktor bermuatan dan konsep kapasitor LLO3: Students are able to understand various forms of electric potential in charged conductors and the concept of capacitors	Ketepatan menjelaskan Integral garis kuat medan listrik, Ketepatan Menjelaskan potensial listrik dan energi potensial listrik Ketepatan menghitung persoalan potensial listrik yang diantaranya adalah potensial listrik oleh muatan diskrit, cincin bermuatan, dan bola bermuatan.	Kriteria: Pedoman Penilaian Teknik non-test: Penjelasan materi kuliah Diskusi dan tanya-jawab Mengerjakan latihan soal bersama-sama di buku tentang integral garis	Kuliah: Diskusi, [TM: 1mgx(3sksx50")] • Tugas-1: Menyusun ringkasan kuliah dan menyelesaiakan soal – soal konsep integral garis kuat medan listrik, potensial listrik, energi potensial listrik, kapasitor [PT+BM:(1+1)x(2x60")]	Kuliah tatap muka daring (Zoom); Diskusi; [TM: 1mgx(3sksx50")] Tugas-1: Menyusun ringkasan kuliah dan menghitung potensial listrik oleh muatan diskrit dan bola bermuatan [PT+BM:(1+1)x(2x60")]	Potensial Listrik Potensial Listrik pada konduktor bermuatan Electric Potential Electric potential in	17,5%

Ketepatan Menjelaskan konsep kapasitor dan enghitung nilai kapasitansi Accuracy describes the line integral to the electric field, Accuracy Describe electric potential and electric potential energy Accuracy in calculating electric potential problems which include electric potential by discrete charges, charged rings and charged spheres. Accuracy Explain the concept of capacitor and calculate the value of capacitance	kuat medan listrik, potensial listrik, dan energi potensial listrik, kapasitor Teknik test: Latihan soal& Tugas Criteria: assessment Guidelines Non-test technique: • Explanation of course material • Discussion and questions and answers • Doing practice problems together in books on the integral of electric field lines, electric potential, and electric	Asistensi: Menghitung potensial listrik oleh muatan diskrit, cincin bermuatan, dan bola bermuatan [TM: 1mgx(1sksx50")] • Lectures: • Discussion, [TM: 1weekx(3sksx50")] • Task-1: Compile a lecture summary and complete questions on the concept of integral lines of electric field strength, electric potential, electric potential energy, capacitors [PT+BM:(1+1)x(2x60")] • Assistance: Calculates the electric potential by discrete	Asistensi: [TM: 1mgx(1sksx50")] • Face-to-face online lectures (Zoom); • Discussion; [TM: 1weekx(3sksx50")] • Task-1: Compile a lecture summary summary and calculate the electric potential by discrete charges and charged balls [PT+BM:(1+1)x(2x60")] Assistance: [TM: 1mgx (1sksx50")]	charged conductors Pustaka / references: Halliday,R.,et all, 2014 Douglas C. Giancoli, 2014 Serway, 2004 Tim Dosen Fisika ITS	

| | | | potential energy, capacitors

Test technique: Practice questions & Assignments | charges, charged rings, and charged spheres[TM: 1weekx(1sksx50")] | | | |
|---|---|---|---|---|---|---|---|
| 6,7 | Sub-CPMK 4: Mahasiswa mampu memahami konsep arus dan mampu menghitung besaran-besaran dalam rangkaian arus searah.

LLO4: Students are able to understand the concept of current and be able to calculate quantities in a direct current circuit. | Ketepatan menjelaskan konsep arus dan hukum ohm; Ketepatan menjelaskan arus dan tegangan dalam rangkaian terbuka ataupun tertutup; Ketepatan menjelaskan Hukum kirchoff Ketepatan menghitung penyelesaian soal-soal yang berkaitan dengan arus searah;

Accuracy explains the concept of current and ohms law; Accuracy describes currents and voltages in open or closed circuits; | Kriteria: Pedoman Penilaian

Teknik non-test: Penjelasan materi kuliah Diskusi dan tanya-jawab Mengerjakan latihan soal bersama-sama di buku tentang konsep arus, hukum ohm, hukum kirchoff arus dan tegangan dalam rangkaian terbuka/tertutup | Kuliah: Diskusi, [TM: 1mgx(3sksx50")]

• Tugas-1: Menyusun ringkasan kuliah dan menyelesaiakan soal – soal konsep arus, hukum ohm, hukum kirchoff. [PT+BM:(1+1)x(2x60")]

Latihan Soal dan Asistensi: Menghitung arus dan tegangan dalam rangkaian terbuka ataupun tertutup | Kuliah tatap muka daring (Zoom); Diskusi; [TM: 1mgx(3sksx50")] Tugas-1: Menyusun ringkasan ringkasan kuliah dan menghitung besaran dalam konsep arus searah [PT+BM:(1+1)x(2x60")] Asistensi [TM: 1mgx(1sksx50")]

• Face-to-face online lectures (Zoom); • Discussion; [TM: 1mgx (3sksx50")] | Arus Searah

Arus searah, hukum ohm dan hukum kirchoff

Direct current

Direct current, Ohms law and Kirchoff's law

Pustaka / references : Halliday,R.,et all, 2014 Douglas C. Giancoli, 2014 Serway, 2004 | 17,5% |

		Accuracy explaining Kirchoff's Law The accuracy of calculating the solving of problems related to direct current;	Teknik test: Latihan soal& Tugas Criteria: assessment Guidelines Non-test technique: • Explanation of course material • Discussion and questions and answers • Doing practice problems together in books on the concept of current, ohms law, current kirchoff law and voltage in open / closed circuits Test technique:	[TM: 1mgx(1sksx50")] • Lectures: • Discussion, [TM: 1weekx (3sksx50 ")] • Task-1: Compile a lecture summary and solve problems on the concept of currents, Ohm's law, Kirchoff's law. [PT + BM: (1 + 1) x (2x60 ")] • Exercise and Assistance: Calculates current and voltage in open or closed circuits [TM: 1weekx (1sksx50 ")]	Task-1: Prepare a lecture summary summary and calculate the quantity in the concept of direct current [PT + BM: (1 + 1) x (2x60 ")] • Assistance [TM: 1mgx (1sksx50 ")]	Tim Dosen Fisika ITS	

			Practice questions & Assignments				
8	Evaluasi tengah semester / Midterm Exam						
9,10	Sub-CPMK5: Mampu menggunakan rumus gaya magnet dan medan magnet terhadap arus listrik dan muatan bergerak Sub-CPMK6: menganalisa peranan magnetisasi dalam material magnetik dan hysteresis loop LLO5: Able to apply magnetic force formulas and magnetic fields to electric currents and moving charges LLO6: analyzes the role of magnetization in magnetic materials and hysteresis loops	4.1 Ketepatan menjelaskan tentang gaya magnet serta gerak partikel-bermuatan dan kumparan dalam medan magnet; Ketepatan memformulasikan dan menggunakan rumus induksi magnet oleh arus listrik; Ketepatan menjelaskan peranan magnetisasi dalam material magnetik dan kurva histeresis Accuracy describes the magnetic force and motion of charged-particles and coils in a magnetic field; Accuracy in formulating and using the formula	Kreteria: Menggunakan rubrik Teknik non-test: Menyelesaikan tugas (essay); Meringkas materi kuliah Teknik test: Quiz-2 (dengan sub-CPMK 5) EAS (dengan sub-CPMK 5 & 6) Criteria: Using a rubric Non-test technique: • Complete assignments (essays); • Summarize the course material	Kuliah; Diskusi; [TM: 1mgx(3sksx50")] • Tugas-1: Menyelesaikan soal essay perhitungan induksi magnet dan gaya magnet Tugas-2: Menyusun ringkasan peranan induksi magnetik dalam teknologi [PT+BM:(1+1)x(3x60")] Asistensi [TM: 1mgx(1sksx50")] • Lectures; • Discussion; [TM: 1weekx (3sksx50 ")] • Task-1: Complete an essay problem for calculating magnetic	Kuliah tatap muka maya dan diskusi melalui Zoom [TM: 1mgx(3x50")] • MyITS classroom: Kuliah asinkronus dan forum diskusi Assignement/ Tugas [PT+BM:(1+1)x(3x60")] Quiz-2 dan EAS: daring melalui myITS classroom (bersama dengan sub-CPMK 5 & 6) Asistensi [TM: 1mgx(1sksx50")] • Face-to-face virtual lectures and discussions via Zoom [TM: 1weekx (3x50 ")]	Gaya Magnet & Medan Magnet: gaya magnet pada partikel bermuatan dan kumparan dalam pengaruh medan magnet, induksi magnet oleh arus listrik, serta aplikasinya dalam teknologi Magnetic Force & Magnetic Field: magnetic	15%

		for magnetic induction by electric currents; Accuracy explains the role of magnetization in magnetic materials and hysteresis curves	Test technique: • Quiz-2 (with sub-CPMK 5) EAS (with sub-CPMK 5 & 6)	induction and magnetic force • Task-2: Summarize the role of magnetic induction in technology [PT + BM: (1 + 1) x (3x60 ")] Assistance [TM: 1weekx (1sksx50 ")]	• MyITS classroom: Asynchronous lectures and discussion forums Assignement / Task [PT + BM: (1 + 1) x (3x60 ")] Quiz-2 and EAS: online via myITS classroom (together with sub-CPMK 5 & 6) Assistance [TM: 1weekx (1sksx50 ")]	force on charged particles and coils under the influence of magnetic fields, magnetic induction by electric currents, and their application in technology	
11,12	Sub-CPMK7: Memahami prinsip timbunya gaya gerak listrik, dan arus dalam resistor, kapasitor dan induktor LLO7: Understand the principle of electromotive force, and currents in resistors, capacitors and inductors	4.1 Ketepatan menjelaskan tentang Hukum Faraday, Hukum Lenz dan timbulnya GGL induksi; Ketepatan memformulasikan dan menggunakan rumus GGL Induksi, iduktansi diri, induktansi silang dan energi yang tersimpan pada induktor	Kreteria: Menggunakan rubrik Teknik non-test: Menyelesaikan tugas (essay); Meringkas materi kuliah Keaktifan Teknik test:	Kuliah; Diskusi; [TM: 1mgx(3sksx50")] • Tugas-1: Menyelesaikan soal essay perhitungan mengenaiGGL Induksi Latihan soal dan Asistensi: Latihan soal-soalGGL Induksi [TM: 1mgx (1sksx50")]	Kuliah tatap muka maya dan diskusi melalui Zoom [TM: 1mgx(3sksx50")] • MyITS classroom: Kuliah asinkronus dan forum diskusi Assignement/ Tugas [PT+BM:(1+1)x(3x60")]	GGL Induksi: Hukum Faraday, Hukum Lenz, GGL induksi, Induktansi diri dan induktansi gandeng; energi pada induktor;	17,5%

		Accuracy explains Faraday's Law, Lenz's Law and the emergence of induced EMF; Accuracy to Accuracy to formulate and use the formula EMF Induction, self-iductance, cross inductance and energy stored in the inductor	Quiz-2 (dengan sub-CPMK 4) EAS (dengan sub-CPMK 5 & 6) Criteria: Using a rubric Non-test technique: • Complete assignments (essays); • Summarize the course material • Activeness Test technique: • Quiz-2 (with sub-CPMK 4) • EAS (with sub-CPMK 5 & 6)	• Lectures; • Discussion; [TM: 1weekx(3sksx50")] • Task-1: Complete a computation essay on induced emf • Exercise and Assistance: Practice Induction GGL questions [TM: 1weekx (1sksx50")]	Quiz-2 dan EAS: daring melalui myITS classroom (bersama dengan sub-CPMK 5 & 6) Asistensi: Latihan soal-soalGGL Induksi [TM: 1mgx (1sksx50")] • Face-to-face virtual lectures and discussions via Zoom [TM: 1weekx (3sksx50")] • MyITS classroom: Asynchronous lectures and discussion forums Assignement / Task [PT + BM: (1 + 1) x (3x60")] Quiz-2 and EAS: online via myITS classroom (together with sub-CPMK 5 & 6) • Assistance: Practice Induction GGL questions	Induced EMF: Faraday's Law, Lenz's Law, Induced EMF, Self-Inductance and Coupled Inductance; energy in the inductor;	

				[TM: 1weekx (1sksx50")]		
13,14	Sub-CPMK 6: mampu menjelaskan konsep arus bolak-balik, gejala transient, menganalisa dan memecahkan permasalahan tentang rangkaian RLC LLO6: able to explain the concept of alternating current, transient symptoms, analyze and solve problems about the RLC circuit	Ketepatan menjelaskan konsep arus bolak-balik; Ketepatan menjelaskan gejala transien; Ketepatan menghitung penyelesaian soal-soal yang berkaitan dengan rangkaian RLC; Accuracy explains the concept of alternating current; Accuracy in describing transient symptoms; Accuracy in calculating the solving of problemsrelated to the RLC circuit;	Kriteria: Menggunakan rubrik Teknik test: Tugas mandiri/kelompok Teknik non-test: Meringkas materi kuliah; Kehadiran Keaktifan Criteria: Using a rubric Test technique: Independent / group assignments Non-test technique:	Kuliah: Diskusi, [TM: 1mgx(3sksx50")] • Tugas: Menyusun ringkasan kuliah dan menghitung besaran dalam rangkaian RLC (impedansi, sudut fasa, harga arus efektif, frekuensi resonansi) [PT+BM:(1+1)x(2x60")] Latihan soal dan Asistensi: Latihan soal rangkaian arus bolak-balik [TM: 1mgx(1sksx50")] • Lectures: • Discussion, [TM: 1mgx (3sksx50")]	Kuliah tatap muka online (Zoom); Diskusi; [TM: 1mgx(3sksx50")] Tugas-1: Menyusun ringkasan kuliah dan mencari penyelesaian soal-soal rangkaian RLC (impedansi, sudut fasa, harga arus efektif, frekuensi resonansi) [PT+BM:(1+1)x(2x60")] Asistensi: Latihan soal rangkaian arus bolak-balik [TM: 1mgx(1sksx50")] • Face-to-face online lectures (Zoom); • Discussion;	Arus Bolak-Balik Arus bolak-balik; gejala Transien;rangkaian RLC Alternating Current Alternating current; symptoms Transients; RLC circuits Pustaka / references : Buku Diktat Tim Dosen Fisika ITS Halliday,R.,et all, 2014	17,5%

| | | | • Summarize the lecture material;
• Attendance
• Activeness | • Task: Compile a lecture summary and calculate the quantities in the RLC circuit (impedance, phase angle, effective current value, resonant frequency)
[PT + BM: (1 + 1) x (2x60 ")]
• Practice questions and Assistance: Exercise problems with alternating current circuits
[TM: 1mgx (1sksx50 ")] | [TM: 1weekx (3sksx50 ")]
Task-1: Compile a lecture summary and calculate and solve RLC circuit problems (impedance, phase angle, effective current value, resonant frequency)
[PT + BM: (1 + 1) x (2x60 ")]
• Assistance: Exercise circuit problems alternating current
[TM: 1weekx (1sksx50 ")] | Douglas C. Giancoli, 2014
Serway, 2004 | |
| 15,16 | Evaluasi Akhir Semester / Final exam | | | | | | 100 % |

Catatan sesuai dengan SN Dikti Permendikbud No 3/2020:

Capaian Pembelajaran Lulusan PRODI (CPL-PRODI) adalah kemampuan yang dimiliki oleh setiap lulusan PRODI yang merupakan internalisasi dari sikap, penguasaan pengetahuan dan ketrampilan sesuai dengan jenjang prodinya yang diperoleh melalui proses pembelajaran.

CPL yang dibebankan pada mata kuliah adalah beberapa capaian pembelajaran lulusan program studi (CPL-PRODI) yang digunakan untuk pembentukan/pengembangan sebuah mata kuliah yang terdiri dari aspek sikap, ketrampilan umum, ketrampilan khusus dan pengetahuan.

CP Mata kuliah (CPMK) adalah kemampuan yang dijabarkan secara spesifik dari CPL yang dibebankan pada mata kuliah, dan bersifat spesifik terhadap bahan kajian atau materi pembelajaran mata kuliah tersebut.

Sub-CP Mata kuliah (Sub-CPMK) adalah kemampuan yang dijabarkan secara spesifik dari CPMK yang dapat diukur atau diamati dan merupakan kemampuan akhir yang direncanakan pada tiap tahap pembelajaran, dan bersifat spesifik terhadap materi pembelajaran mata kuliah tersebut.

Indikator penilaian kemampuan dalam proses maupun hasil belajar mahasiswa adalah pernyataan spesifik dan terukur yang mengidentifikasi kemampuan atau kinerja hasil belajar mahasiswa yang disertai bukti-bukti.

3. RPS Chemistry/ *Semester Study Plan of Chemistry*

Minggu Ke Week	Pertemuan ke Meeting	Materi Kuliah Course Material	
1	1	Rencana Pembelajaran/Kontrak Kuliah Proses Analisis Materi (unsur,senyawa,sifat Kimia,Fisika) Lesson Plan / CourseContract Material Analysis Process (elements, compounds, chemical and physics properties)	Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Konsep Dasar Kimia Students are able to explain the basic principles of chemistry, including the basic concepts of chemistry
	2	Hukum dasar penggabungan unsur (Proust, Lavoisier, Dalton)/ Perkembangan model dan struktur atomi Basic law of elements compounding (Proust, Lavoisier, Dalton) / atomic models and structures development	

2	3	Lanjutan Perkembangan model atom dan percobaan yang mendasarinya (Dalton, Thompson, Rutherford, Bohr dan Spektrum Atom H2. Continued development of the atomic model and the experiments that underlied (Dalton, Thompson, Rutherford, Bohr and H2 atom spectrum)	Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Model dan Struktur Atom Students are able to explain the basic principles of chemistry, including Atomic Model and Structure
	4	Konfigurasi elektron suatu unsur dan ion Sistem dan Sifat Periodik Unsur Latihan / diskusi Elements and ions electron configuration The Periodic System and Properties of the Elements Exercise / discussion	
3	5	Satuan Konsentrasi (M, m, N, F, %, ppm, ppb) Perhitungan konsep mol Rumus empiris dan rumus molekul Latihan soal Concentration units (M, m, N, F, %, ppm, ppb) Mole concept calculation Empirical and molecular formula	Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Konfigurasi Elektron dan sifat sistem periodik unsur Students are able to explain the basic principles of chemistry, including Electron Configuration and the properties of the periodic system of elements

		Exercise	
	6	Stoikhiometri dalam Larutan Latihan soal	Konsep Mol, Stoikhiometri dan Sifat Koligatif Larutan
		Stoichiometry in solutions Exercise	Mole concept, Stoichiometry and solution colligative properties
4	7	Ikatan Kimia, ionic, kovalen momen dipol, ikatan logam, ikatan hidrogen, dan ikatan Van der Walls Latihan Soal	Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Ikatan Kimia
		Chemical bonds, ionic, dipole moment covalent, metallic bonding, hydrogen bonding, and Van der Walls bonding Exercise	Students are able to explain the basic principles of chemistry, including Chemical Bonds
	8	Ikatan Kovalen koordinasi Struktur dan bentuk geometri molekul (struktur Lewis, dan hibridisasi) Latihan Soal	
		Covalent bonds, coordination structure and molecular geometry (Lewis structure and hybridization) Exercise	
5	9	QUIZ Materi sd minggu ke-3/4 Quis Materials to 3/4th week	

	10	Teori orbital molekul Latihan soal Molecular orbital theory Exercise	
6	11	Wujud Gas (Hukum-hukum gas dan sifat fisiknya) Latihan soal Gas state (Gas laws and its physical properties) Exercise	Mahasiswa mampu menjelaskan prinsip-prinsip Students are able to explain the principles
	12	Wujud Cair (sifat fisik cairan: tekanan uap, titik didih, tegangan permukaan, viskositas, wujud padat kisi kristal kubus sederhana simple cube, kubus berpusat muka face centered cube, kubus berpusat badan body centered cube, indeks Miller, persamaan Bragg) Liquid state (liquid physical properties: vapor pressure, boiling point, surface tension, viscosity, crystal lattice solid state, simple cube, face centered cube, body centered cube, Miller index, Bragg equation).	dasar kimia meliputi Wujud Zat dan Perubahan Fasa chemistry base including state of matters and phase changes

7	13	Larutan. Teori Asam Basa (Teori Arrhenius, Brønsted-Lowry,Teori Lewis) Derajat ionisasi dan Tetapan Kekuatan Asam Basa Solution Acid Base Theory (Arrhenius Theory, Brønsted-Lowry, Lewis Theory) Degree of ionization and Acid Base Strength Constant	Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Kesetimbangan Ionik dalam Larutan Students are able to explain the basic principles of chemistry, including Ionic Equilibrium in Solutions
	14	Latihan soal-soal Exercises	
8	15	ETS Materi minggu ke-4 – ke-6 Mid Term Evaluation Material week 4 – 6	
	16		
9	17	Larutan Buffer, Ksp, Kesetimbangan ionik antara zat padat dan larutan Buffer solution, Ksp, Ionic equilibrium between solids and solutions	Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Kesetimbangan Kimia Students are able to explain the basic principles of chemistry, including Chemical Equilibrium
	18	Latihan soal Exercise	

10	19	Konsep termodinamika (prinsip, keadaan dan proses) Hukum I Termodinamika: energi dalam, kerja dan kalor Kapasitas panas, kalorimetri dan entalpi latihan soal Thermodynamics concept (principles, states and processes) The first law of Thermodynamics: internal energy, work and heat Heat capacity, calorimetry and enthalpy Exercise	Mahasiswa mampu menjelaskan prinsip-prinsip dasar ilmu kimia meliputi, Students are able to explain the basic principles of chemistry including,
	20	Hukum II Termodinamika dan spontanitas Termokimia serta penggunaannya untuk menjelaskan kespontanan reaksi kimia, Energi bebas Gibbs, Entropi The second law of Thermodynamics and spontaneity thermochemistry and its use to explain chemical reactions, Gibbs free energy, Entropy	Termodinamika Kimia dan Termokimia Chemistry Thermodynamics and Thermochemistry
11	21	Perhitungan yang berkaitan dengan aplikasi mesin Carnot Latihan soal Calculations related to the Carnot engine application Exercise	

	22	Konsep kinetika kimia Laju dalam reaksi kimia Penentuan laju reaksi, orde dan konstanta laju reaksi Chemical kinetics concept Rate of chemical reaction Determine reaction rate, order and reaction rate constant	
12	23	Pengaruh suhu pada laju reaksi Reaksi elementer Katalis Effect of temperature on reaction rate Elementary reaction Catalyst	
	24	Latihan soal Exercise	
13	25	QUIZ Quiz	
	26	Konsep reaksi redoks Sel elektrokimia (elektroda dan larutan elektrolit dalam sel elektrokimia) Latihan soal Redox reactions concepts Electrochemical cell (electrode and electrolyte solution in electrochemical cell) Exercise	

14	27	Pengaruh konsentrasi dan persamaan Nerst Penggunaan konsep elektrokimia untuk aplikasi sel volta (baterei dan Fuel Cells) serta elektrolisis Aktivitas dan Latihan soal-soal Concrentation effect and Nerst equation Use of electrochemical concepts for voltaic cell aplications (battery and fuel cells) as well as electrolysis Activity and exercises	*Penilaian* *Assessment*
	28	Latihan soal Exercise	
XV	29,30	EAS Final Term Evaluation	
XVI	31,32	EAS Final Term Evaluation	

No No	Macam Evaluasi Types of Evaluation	Bobot penilaian Assessment Load
1.	Tugas-tugas (distribusi per bab) Assignments (distribution per chapter)	20 %
2.	Q u i z I Quiz I	15 %
3.	Evaluasi Tengah Semester Mid Term Evaluation	25 %
4.	Q u i z. II Quiz II	15 %

5.	Evaluasi Akhir Semester Final term	25 %

Daftar Pustaka
References

Tim Dosen Departemen Kimia ITS. 2019. Kimia 1. edisi kedua. Penerbit Media Bersaudara.