



SEMESTER LEARNING PLAN

DEPARTMENT: URBAN AND REGIONAL PLANNING

FACULTY: CIVIL, PLANNING, AND EARTH

COURSES NAME	PHYSICS I
COURSES CODE	SF184101
SEMESTER	I
CREDITS	3 SKS (4.8 ECTS)
LECTURER	Dra. Endang Susilowati, M. Kes
	Ratna Rintaningrum, S.S., M.Ed., Ph.D Arfan Fahmi, S.S., M.Pd
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COURSE METHODOLOGY						

PROGRAM LEARNING OUTCOME (PLO)

SPESIFIC KNOWLEDGE	1.1	mampu menunjukkan kinerja mandiri, bermutu, dan terukur; <i>Able to demonstrate independent, quality, and measurable performance</i>
	1.2	menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri; <i>Show an attitude of responsibility for work in their field of expertise independently</i>
	1.3	mampu menunjukkan kinerja mandiri, bermutu, dan terukur; <i>Able to demonstrate independent, quality, and measurable performance</i>

COURSES LEARNING OUTCOME (CLO)

SPESIFIC KNOWLEDGE	1. mampu menerapkan pemikiran logis, kritis, sistematis, dan inovatif dalam menyelesaikan masalah dan implementasi ilmu fisika I. <i>Applying logical, critical, systematic, and innovative thinking to solve problems and implementing Physics I</i>
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	<p>2. mampu menunjukkan kinerja mandiri, bermutu, dan terukur; <i>able to demonstrate independent, quality, and measurable performance</i></p> <p>3. menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri; <i>show an attitude of responsibility for work in their field of expertise independently</i></p>
MODULE	
1. Quantities and vectors: base quantities, derived quantities, units, units conversion, scalar and vector quantities, mathematical operations on vectors geometrically and analytically	
2. Particle kinematics: displacement, velocity, acceleration, linear motion, angular motion (parabolic and circular); relative motion.	
3. 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;	
4. Work and energy: the concept of work, kinetic energy, potential energy (gravity and spring), work energy theorem, the law of conservation of mechanical energy,	
5. Impulse and Momentum: impulse, momentum, collision (elastic and inelastic), center of mass;	
6. 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)	
7. Vibration: simple harmonic motion, energy of simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular);	
8. Fluid mechanics: hydrostatic pressure, Pascal's principle, Archimedes principle, surface tension, continuity equation, Bernoulli's equation, viscosity.	

PHYSICS I COURSE LEARNING PLAN
ODD SEMESTER OF ACADEMIC YEAR 2021–2022

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	<p>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.</p> <p>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.</p>	<p>1.1 Ketepatan menjelaskan besaran fisis dan sistem satuan</p> <p>1.2 Ketepatan menjelaskan ciri besaran skalar dan besaran vector serta menerapkan dan menggunakan aljabar vektor</p> <p>1.1 Accuracy in explaining physical quantities and unit systems</p> <p>1.2 Accuracy in describing the features of scalar quantities and vector quantities and applies and uses vector algebra</p>	<p>Kriteria: Menggunakan rubrik analitik dan pedoman penskoran (Marking Scheme)</p> <p>Teknik non-test: Meringkas materi kuliah;</p> <p>Teknik test: Tanya jawab lisan</p> <ul style="list-style-type: none"> Latihan menyelesaikan soal-soal mengenai besaran fisika, satuan, besaran skalar, besaran vektor serta aljabar vektor (Tugas-1: Problem & Solving) 	<ul style="list-style-type: none"> Kuliah: Diskusi, [TM: 1x(2x50")] Tugas-1: Menyusun ringkasan kuliah dan mengerjakan contoh latihan soal yang diberikan dalam kuliah <p>[PT+BM:(1+1)x(2x60")]</p> <ul style="list-style-type: none"> Latihan soal <p>Latihan menyelesaikan soal-aplikasi besaran fisika, satuan, besaran skalar, besaran vektor serta aljabar vektor</p> <p>[PT+BM:(1+1)x(2x60")]</p>	<p>Kuliah tatap muka maya (Zoom); MyITS-Classroom: Sumber belajar:</p> <ul style="list-style-type: none"> https://www.youtube.com/watch?v=GtOGurrUPmQ; https://www.youtube.com/watch?v=0na1JdPEJY; https://www.youtube.com/watch?v=CtysVq9eO-0; https://www.youtube.com/watch?v=xEHZArgLIUo&list=PLyQSN7X0ro23IUORJBSDBH8A 	<p>Besaran dan vektor: Sistem Satuan Internasional (SI), perubahan satuan, besaran dasar, besaran turunan, vektor dan skalar, komponen vektor, vektor satuan, penambahan vektor, perkalian vektor</p>	10%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			<p><i>Criteria:</i> Using analytical rubrics and scoring guidelines (Marking Scheme)</p> <p><i>Non-test technique:</i></p> <ul style="list-style-type: none"> Summarize the lecture material; <p><i>Test technique:</i></p> <ul style="list-style-type: none"> Oral questions and answers Exercises on physical quantities, units, scalar quantities, vector quantities and vector algebra (Assignment-1: Problem & Solving) 	<ul style="list-style-type: none"> 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'')] 	<p>UWZ1mQBna&index=4&t=0s;</p> <ul style="list-style-type: none"> https://www.youtube.com/watch?v=ZAeLLaFxFRo&list=PLYQSN7X0ro23IUORJBSDBH8AUWZ1mQBna&index=5&t=0s; https://www.youtube.com/watch?v=ZCFPNI-Ved4&list=PLYQSN7X0ro23IUORJBSDBH8AUWZ1mQBna&index=6&t=0s <p>Diskusi;</p> <ul style="list-style-type: none"> [TM: 1x(2x50'')] Tugas-1: 	<p>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</p> <p>Pustaka : References</p> <ul style="list-style-type: none"> Halliday, R. 	

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		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					<p>Menyusun ringkasan kuliah dan mengerjakan contoh latihan soal yang diberikan dalam kuliah [PT+BM:(1+1)x(2x60'')]</p> <ul style="list-style-type: none"> • Latihan soal • Latihan menyelesaikan soal-soal aplikasi besaran fisika, satuan, besaran skalar, besaran vektor serta aljabar vektor <p>• [PT+BM:(1+1)x(2x60'')]</p>	<p>,et all, 2014</p> <ul style="list-style-type: none"> • Douglas C. Giancoli, 2014 • Serway, 2004 • Tim Dosen Fisika ITS 	

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		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					<ul style="list-style-type: none"> • Face-to-Face virtuallectures (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=CtysVq9eO-0; 		

Mg Ke- / Week	Kemampuan akhir tiap tahap 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 Pembelajar an / Learning Material	Bobot Penilaian (%) / Assesment Load (%)
		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					<p>v=xEHZArgLIUo&list=PLyQSN7X0ro23IUORJBSD BH8AUWZ1mQBna&</p> <ul style="list-style-type: none"> • index=4&t=0s;https://www.youtube.com/watch?v=ZAeLlaFxR_o&list=PLyQSN7X0ro23IUORJBSD BH8AUWZ1mQBna& • index=5&t=0s;https://www.youtube.com/watch?v=ZCFPNI-Ved4&list=PLyQSN7X0ro23IUORJB 		

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					<p>SDBH</p> <ul style="list-style-type: none"> • 8AUWZ1mQBNa&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")] • Exercise Exercise on the application of physical quantities, vector quantities and 		

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		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					vector algebra • [PT+BM:(1+1)x(2x60'')]		
2,3	<p>Sub-CPMK2: Mampu mendefinisikan Pergeseran posisi, kecepatan, percepatan gerak lurus dan melengkung secara grafis dan matematis serta mendemonstrasikannya (P).</p> <p>LLO2: <i>Be able to define position shift, velocity, straight and curved motion acceleration graphically and mathematically and demonstrate it (P).</i></p>	<p>1.1. Ketepatan menjelaskan prinsip Pergeseran posisi, kecepatan, percepatan</p> <p>1.2. Ketepatan menjelaskan prinsip gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif</p> <p>1.1. Accuracy in explaining the principle of displacement,</p>	<p>Kriteria: Pedoman Penskoran (Marking Scheme) Teknik non-test: • Meringkas materi kuliah • Tanya-jawab lisan • Menyalin contoh soal</p> <p>Teknik test: Latihan soal</p> <p>Criteria: Scoring guidelines (Marking Scheme) Non-test technique: • Summarize the lecture material • Oral questions and</p>	<p>• Kuliah: • Diskusi, [TM: 2x(3x50'')]</p> <p>1.3. • Kuis-1: Menyelesaikan soal-soal posisi, kecepatan, percepatan</p> <p>• Latihan soal: menghitung percepatan suatu benda yang dipengaruhi oleh resultan gaya.</p> <p>• Latihan soal menguraikan persamaan gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif. [PT+BM:(2+2)x(3x60'')</p>	<p>• Kuliah tatap mukamaya; [TM: 2x(3x50'')]</p> <p>• MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=RIGMa_w8gsic;</p> <p>• Kuis-1: Daring dg MyITS Classroom;</p> <p>• Latihan soal: menghitung posisi, kecepatan dan percepatan benda berdasar komponen vektor .</p> <p>• Latihan soal</p>	<p>Kinematika partikel: Pergeseran posisi, kecepatan, percepatan, gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif.</p> <p><i>Position, speed, acceleration, straight motion, curved motion (parabola</i></p>	2%

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		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		<p>velocity and acceleration</p> <p>1.2. Accuracy in explaining the principle of linear motion, angular motion (parabolic and circular); relative motion</p>	<p>answers</p> <ul style="list-style-type: none"> • Transcribe exercise <p>Test technique: Exercise</p>	<p>)]</p> <ul style="list-style-type: none"> • Lecture: • Discussion, [TM: 2x(3x50'')] 1.3. • Quiz-1: Exercise 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 circular); relative motion. [PT+BM:(2+2)x(3x60'')] 	<p>menguraikan persamaan gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif.</p> <ul style="list-style-type: none"> • [PT+BM:(2+2)x(3x60'')] • Face-to-face virtual lectures; • [TM: 2x(3x50'')] • MyITS-Classroom: Learning resources: https://www.youtube.com/watch?v=RIGMa_w8gsic; • Quiz-1: Online with MyITS Classroom; • Exercise: calculate position, speed 	<p>and circular); relative motion.</p>	

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					and acceleration of an object based on vector component. <ul style="list-style-type: none"> Exercise describe equations of linear motion, angular motion (parabola and 		
		1.3. Ketepatan menghitung penyelesaian soal-soal yang berhubungan. Pergeseran posisi, kecepatan, percepatan, gerak lurus, gerak lengkung (paraboladan melingkar); gerak relatif	Kriteria: Pedoman Penskoran (Marking Scheme) Teknik non-test: <ul style="list-style-type: none"> Tanya-jawablisian Menyalin jawaban soal-soal yang dibahas selama perkuliahan Teknik test: <ul style="list-style-type: none"> Quis 1 Latihan soal 	<ul style="list-style-type: none"> 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: 	<ul style="list-style-type: none"> Kuliah tatap mukamaya; [TM: 2x(3x50")] MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=Po7li9JbEs; Kuis-1: Daring dg MyITS Classroom; Latihan soal: 	Kinematika partikel: Pergeseran posisi, kecepatan, percepatan, persamaan gerak lurus sberubah beraturan, gerak lurus s, gerak lengkung (parabola dan	7%

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		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		1.3. Accuracy in calculating the problem solutions related to displacement, velocity, acceleration, linearmotion, angular motion (parabolic and circular); relative motion	<ul style="list-style-type: none"> Tugas Rumah <p>Criteria: Scoring guidelines (Marking Scheme)</p> <p>Non-test technique:</p> <ul style="list-style-type: none"> Oral questions and answers Transcribe exercises discussed during lectures <p>Test technique:</p> <ul style="list-style-type: none"> Quiz 1 Exercise Home assignment 	<p>Menghitung permasalahan gerak lurus beraturan (GLB) dan gerak lurus berubah beraturan (GLBB)</p> <ul style="list-style-type: none"> Latihan soal Menghitung gerak lurus, gerak lengkung (parabola dan melingkar); 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 	<p>Menghitung kecepatan rata – rata dan sesaat, percepatan rata –rata dan sesaat.</p> <ul style="list-style-type: none"> Latihan soal: Menghitung permasalahan gerak lurus beraturan (GLB) dan gerak lurus berubah beraturan (GLBB) Latihan soal Menghitung gerak lurus, gerak lengkung (parabola dan melingkar); gerak relatif Face-to-face virtuallecture; 	<p>melingkar); gerak relatif.</p> <p>Particle kinematics: Displacement ,velocity, acceleration, uniformly accelerated motion equation, linear motion, angular rotation (parabolic and circular); relative motion</p>	

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		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				<p><i>instantaneous velocity, average and instantaneous acceleration</i></p> <p><i>Exercise Calculating the problem of uniform motion (GLB) and uniformly accelerated motion (GLBB)</i></p> <ul style="list-style-type: none"> <i>Exercise Calculate linear motion, angular motion (parabolic and circular); relative motion</i> <p>[PT+BM:(2+2)x(3x60'')]</p>	<p>[TM: 2x(3x50'')]</p> <ul style="list-style-type: none"> <i>MyITS-Classroom: Learning resources: https://www.youtube.com/watch?v=Po7I9JbEs;</i> <i>Quiz-1: Online with MyITS Classroom;</i> <i>Exercise: Calculate the average and instantaneous velocity, average and instantaneous acceleration</i> <i>Exercise: Calculating the problem of uniform motion (GLB) and</i> 		

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		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					<i>uniformly accelerated motion (GLBB)</i> <ul style="list-style-type: none"> 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 serta mendemonstrasikannya (M-4) <i>Practicum LLO3: Able to use the concepts and theories of displacement, velocity, linear and angular acceleration and demonstrate it (M-4)</i>	1.4. Ketepatan menghitung dan mendemonstrasikan pergeseran posisi, kecepatan, percepatan 1.4. Accuracy in calculating and	Kriteria: Rubrik Modul praktikum Fisika Dasar 1 Teknik non-test: <ul style="list-style-type: none"> Praktikum di dampingi oleh asisten lab. Mencatat Data hasil praktikum, acc asisten. Teknik test: <ul style="list-style-type: none"> Tes 	<ul style="list-style-type: none"> Praktikum: Modul M-...: Gerak, kecepatan dan percepatan 7 jam: Tutorial / Pre-test, Persiapan, Pelaksanaan Praktikum, Penyusunan laporan, Presentasi hasil. Practicum: Module week - : Motion, velocity and 	<ul style="list-style-type: none"> Mengakses demonstrasi praktikum secara real time yang dilakukan oleh asisten, melalui livestreaming Melakukan praktikum Mandiri Menggunakan program animasi yang telah 		5%

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		Indikator / Indicator	Kriteria & Teknik / Criteria & Techniques	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	Face to Face (5)	On-line (6)	(7)	(8)
		<i>demonstrating displacement, velocity and acceleration.</i>	<ul style="list-style-type: none"> • pendahuluan lisan. • Laporan akhir • presentasi <p>Criteria: Rubric Physics 1 Practicum module Non-test technique:</p> <ul style="list-style-type: none"> • Practicum assisted by laboratory assistant • Record data on practicum results, acc assistant • Test technique: • Oral preliminary test • Final report • Presentation 	<i>acceleration 7 hours: Tutorial / Pre-test, Preparation, Practicum implementation, Report preparation, Result presentation.</i>	<p>disiapkanoleh TIM ITS</p> <ul style="list-style-type: none"> • <i>Accessing real-timepracticum demonstration by the assistant through live streaming</i> • <i>Doing practicum independently using animation programs prepared by ITS Team</i> 		
	Asistensi Sub-CPMK3: Mampu menggunakan konsep dan teori pergeseran posisi, kecepatan, percepatan gerak lurus dan melengkung serta	1.5. Ketepatan menghitung penyelesaian soal-soal yang berhubungan dengan posisi,	Kriteria: Pedoman Penskoran (<i>Marking Scheme</i>)	<ul style="list-style-type: none"> • Pembahasan soal – soal terkait posisi, kecepatan, percepatan, gerak lurus, gerak lengkung (parabola 	<ul style="list-style-type: none"> • Kuliah oleh asisten melalui tatap muka 	Kinematika partikel: Pergeseran posisi, kecepatan, percepatan,	2%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<p>mendemonstrasikannya (P).</p> <p><i>Assistance</i> LLO3: Able to use the concepts and theories of displacement, velocity, linear and angular acceleration and demonstrate it (P).</p>	<p>kecepatan, percepatan, gerak lurus, gerak melingkar (parabola dan melingkar); gerak relative</p> <p>1.5. Accuracy in calculating the problem solutions related to position, velocity, acceleration, linear motion, angular motion (parabolic and circular); relative motion</p>	<p>Teknik non-test:</p> <ul style="list-style-type: none"> • Tanya-jawab lisan • Menyalin jawaban soal- soal yang dibahas oleh asisten selamaperkuliahan. <p>Teknik test:</p> <ul style="list-style-type: none"> • Keaktifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten <p>Criteria: Scoring guidelines (Marking Scheme)</p> <p>Non-test technique:</p> <ul style="list-style-type: none"> • Oral questions and answers • Transcribe exercises 	<p>dan melingkar); gerak relatif</p> <ul style="list-style-type: none"> • Diskusi, [TM: 1x(3x50'')] • Discussing questions related to position, velocity, acceleration, linear motion, angular motion (parabolic and circular); relative motion • Discussion, [TM: 1x(3x50'')] 	<p>maya;</p> <ul style="list-style-type: none"> • Pembahasan soal melalui myITS Classroom, group Wa, Line, dll. <p>[TM: 1x(3x50'')]</p> <ul style="list-style-type: none"> • MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=Po7li9JbEs; • Face-to-face 	<p>persamaan gerak lurus sberubah beraturan, gerak lurus s, gerak melingkar (parabola dan melingkar); gerak relatif.</p> <p>Particle kinematics: Displacement, velocity, acceleration, uniformly accelerated motion equation, linear motion, angular rotation (parabolic and</p>	

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			<p><i>discussed with the assistant during lectures</i></p> <p><i>Test technique:</i></p> <ul style="list-style-type: none"> • <i>Originality and accuracy of answering questions asked by the assistant</i> 		<p><i>virtual lecture by the assistant;</i></p> <ul style="list-style-type: none"> • <i>Discussing questions through myITS Classroom, Wa group, Line, dll. [TM: 1x(3x50")]</i> • <i>MyITS-Classroom: Learning resources: https://www.youtube.com/watch?v=Po7Ii9JbEs;</i> 	<i>circular); relative motion</i>	
4,5	Sub-CPMK3: Mampu menggunakan konsep dan teori Newton I, II, dan III untuk menguraikan gaya-gaya pada berbagai sistem benda, serta mendemonstrasikannya (P).	1.1. Ketepatan menjelaskan prinsip Hukum Newton I, Hukum Newton II, dan Hukum	<p>Kriteria: Pedoman Penskoran (<i>Marking Scheme</i>) Teknik non-test:</p> <ul style="list-style-type: none"> • Meringkas 	<ul style="list-style-type: none"> • Kuliah: • Diskusi, [TM: 1x(3x50")] • Kuis-1: Menyelesaikan soal-soal Hukum Newton 	<ul style="list-style-type: none"> • Kuliah tatap mukamaya; [TM: 1x(3x50")] • MyITS-Classroom: Sumber belajar: 	Dinamika partikel: Hukum Newton I, II dan III, macam-macam gaya	2%

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LLO3: Able to use Newton I, II and III concepts and theories to describe forces in various systems of objects, and demonstrate it (P)	<p>Newton III</p> <p>1.2. Ketepatan Menjelaskan prinsip macam- macam gaya (gaya gravitasi, gaya berat, gaya apung, gaya berat, gaya tegangan tali, gaya normal, gaya gesek, gaya pegas).</p> <p>1.1. Accuracy in describing the principles of Newton's first, second and third law</p> <p>1.2. Accuracy in describing the principles of various forces (gravitational force, weight</p>	<p>materi kuliah</p> <ul style="list-style-type: none"> • Tanya-jawablisian • Menyalin contoh soal <p>Teknik test: Latihan soal</p> <p>Criteria: Scoring guidelines (Marking Scheme) Non-test technique:</p> <ul style="list-style-type: none"> • Summarize the lecture material • Oral questions and answers • Transcribe exercise <p>Test technique: Exercise</p>	<ul style="list-style-type: none"> • Latihan soal: menghitung percepatan suatu benda yang dipengaruhi oleh resultan gaya. • Latihan soal menguraikan komponen-komponen 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 	<ul style="list-style-type: none"> • https://www.youtube.com/watch?v=g550H4e5FCY • Kuis-1: Daring dg MyITS Classroom; • Latihan soal: menghitung percepatan suatu benda yang dipengaruhi oleh resultan gaya. • Latihan soal menguraikan komponen-komponen gaya yang dimiliki oleh suatu benda pada bidang horizontal, bidang miring, 	<p>(gaya gravitasi, gaya berat, gaya tegang tali, gaya normal, gaya gesek dan gaya pegas), kesetimbangan gaya, penerapan hukum Newton I,II dan.</p> <p>Particle dynamics: Newton's first, second and third law, types of forces (forces (gravitational force, weight force, buoyant</p>	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		force, buoyant force, tension force, normal force, friction force, spring force)		<p>acceleration an object which is affected by the resultant force</p> <ul style="list-style-type: none"> Exercise describes the force components of an object in the horizontal plane, inclined plane and pulley <p>[PT+BM:(2+2)x(3x60")</p>	<p>dan katrol. [PT+BM:(2+2)x(3x60")]</p> <ul style="list-style-type: none"> 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 	force, tension force, normal force, friction force, spring force), equilibrium of forces, Newton's laws application.	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					<p><i>the resultant force.</i></p> <ul style="list-style-type: none"> • Exercise describes the force components of an object in the horizontal plane, inclined plane and pulley [PT+BM:(2+2)x(3x60")] 		
		1.3. Ketepatan menghitung penyelesaian soal-soal yang berhubungan dengan Hukum Newton I, Hukum Newton II, dan Hukum Newton III	<p>Kreteria: Pedoman Penskoran (Marking Scheme)</p> <p>Teknik non-test:</p> <ul style="list-style-type: none"> • Tanya-jawablisian • Menyalin jawaban soal-soal yang dibahas selama perkuliahan 	<ul style="list-style-type: none"> • Kuliah: • Diskusi, [TM: 2x(3x50")] • Kuis-1: Menyelesaikan soal-soal Hukum Newton • Latihan soal: Menghitung kecepatan / gaya gesek benda, pada bidang horizontal karena adanya 	<ul style="list-style-type: none"> • Kuliah tatap mukamaya; [TM: 2x(3x50")] • MyITS-Classroom: Sumber belajar: • https://www.youtube.com/watch?v=RDwXQeWWbz0 	Dinamika partikel: Hukum Newton I, II dan III, macam-macam gaya (gaya gravitasi, gaya berat, gaya tegang tali, gaya	7 %

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		1.3. Accuracy in calculating the problem solutions related to Newton's first, second and third law	<p>Teknik test:</p> <ul style="list-style-type: none"> • Quis 1 • Latihan soal • Tugas Rumah <p>Criteria: Scoring guidelines (Marking Scheme)</p> <p>Non-test technique:</p> <ul style="list-style-type: none"> • Oral questions and answers <p>Transcribe exercises discussed during lectures</p> <p>Test technique:</p> <ul style="list-style-type: none"> • Quiz 1 • Exercise Home assignment 	<p>pengaruh resultan gaya.</p> <ul style="list-style-type: none"> • Latihan soal: Menghitung kecepatan / gaya gesek benda, pada bidang miring karena adanya pengaruh resultan gaya. • Latihan soal Menghitung tegangan tali pada katrol, akibat adanya gaya berat benda. [PT+BM:(2+2)x(3x60")] • Lecture: [TM: 2x(3x50")] • Quiz-1: Solve problems on Newton's laws 	<ul style="list-style-type: none"> • 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 adanya pengaruh resultan gaya. • Latihan soal Menghitung 	<p>normal, gaya gesek dan gaya pegas), kesetimbangan gaya, penerapan hukum Newton I, II dan.</p> <p>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</p>	

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				<ul style="list-style-type: none"> • 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 • Exercise Calculate the rope tension on the pulley due to the object's weight force [PT+BM:(2+2)x(3x60")] 	<ul style="list-style-type: none"> • Face-to-face virtual lecture; [TM: 2x(3x50")] • MyITS-Classroom: Learning resources: <ul style="list-style-type: none"> • https://www.youtube.com/watch?v=wXQeWWbz0 • Quiz-1: Online with MyITS Classroom; • Exercise: Calculate velocity/friction force of an object 	forces, Newton's laws application.	

Mg Ke- / Week	Kemampuan akhir tiap tahap belajar (Sub- CPMK) / <i>Final ability of each learning stage (LLO)</i>	Penilaian / <i>Assesment</i>		Bentuk Pembelajaran; Metode Pembelajaran; Penugasan Mahasiswa; / <i>Form of Learning; Learning Method; Student Assignment;</i>		Materi Pembelajaran / <i>Learning Material</i>	Bobot Penilaian (%) / <i>Assesment Load (%)</i>
		Indikator / <i>Indicator</i>	Kriteria & Teknik / <i>Criteria & Techniques</i>				
(1)	(2)	(3)	(4)	Face to Face (5)	On-line (6)	(7)	(8)
					<p><i>on horizontal plane due to the effect of the resultant force</i></p> <ul style="list-style-type: none"> • <i>Exercise: Calculate velocity/friction force of an object on inclined plane due to the effect of the resultant force</i> • <i>Exercise Calculate the rope tension on the pulley due to the object's weight force</i> 		

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<p>Praktikum Sub-CPMK3: Mampu menggunakan konsep dan teori Newton I, II, dan III untuk menyelesaikan masalah gaya-gaya dalam fisika, serta mendemonstrasikannya (M-4).</p> <p><i>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).</i></p>	<p>1.4. Ketepatan menghitung dan mendemonstrasikan koefisien gesek statis dan kinetis</p> <p><i>1.4. Accuracy in calculating and demonstrating static and kinetic friction coefficient</i></p>	<p>Kriteria: Rubrik Modul praktikum Fisika Dasar 1</p> <p>Teknik non-test:</p> <ul style="list-style-type: none"> Praktikum di dampingi oleh asisten lab. Mencatat Data hasil praktikum, acc asisten. <p>Teknik non-test:</p> <ul style="list-style-type: none"> Tes pendahuluan lisan. Laporan akhir Presentasi <p>Criteria: Rubric Physics 1 Practicum module Non-test technique:</p> <ul style="list-style-type: none"> Practicum assisted by laboratory assistant 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Mengakses demonstrasi praktikum secara real time yang dilakukan oleh asisten, melalui livestreaming Praktikum Mandiri Menggunakan program animasi yang telah disiapkan oleh TIM ITS Accessing real-time practicum demonstration by the assistant through live streaming Doing practicum 		5%

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			<ul style="list-style-type: none"> Record data on practicum results, acc assistant Test technique: <ul style="list-style-type: none"> Oral preliminary test Final report Presentation 		<i>independently using animation programs prepared by ITS Team</i>		
	<i>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).</i>	1.5. Accuracy in calculating the problem solutions related to Newton's first, second and third law	<ul style="list-style-type: none"> Menyalin jawaban soal- soal yang dibahas oleh asisten selamaperkuliahan. Teknik test: <ul style="list-style-type: none"> Keatifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten Criteria: Scoring guidelines (Marking Scheme) Non-test technique: <ul style="list-style-type: none"> Oral questions and answers 	[TM: 2x(3x50'')] <ul style="list-style-type: none"> Discussing questions related to Newton's first, second and third law <ul style="list-style-type: none"> Discussion, [TM: 2x(3x50'')] 	https://www.youtube.com/watch?v=rhT5xGS-f8 <ul style="list-style-type: none"> Face-to-face virtual lecture by the assistant; Discussing questions through myITS Classroom, Wa group, Line, dll. [TM: 1x(3x50'')] 	gaya berat, gaya tegang tali, gaya normal, gaya gesek dan gaya pegas), kesetimbangan gaya, penerapan hukum Newton I,II dan III. <i>Particle dynamics: Newton's first, second</i>	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			<p><i>Transcribe exercises discussed with the assistant during lectures</i></p> <p><i>Test technique: Originality and accuracy of answering questions asked by the assistant</i></p>		<ul style="list-style-type: none"> • MyITS-Classroom: Learning resources: https://www.youtube.com/watch?v=wrhT5xGS-f8 	<p><i>and third law, types of forces (gravitational force, weight force, buoyant force, tension force, normal force, friction, force, spring force), equilibrium of forces, Newton's laws application.</i></p>	
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	4.1 Ketepatan Menjelaskan kerja dan energi: konsep kerja, energi kinetik, energi potensial (gravitasi dan pegas)	<p>Kriteria: Pedoman Penilaian</p> <p>Teknik non-test:</p> <ul style="list-style-type: none"> • Penjelasan materi kuliah • Diskusi dan tanya-jawab 	<ul style="list-style-type: none"> • Kuliah: • Diskusi, [TM: 1x(2x50'')] • Tugas: Menyelesaikan soal-soal konsep kerja, Energi Potensial 	<ul style="list-style-type: none"> • Kuliah tatap mukadaring (zoom); [TM: 1x(2x50'')] • MyITS-Classroom: https://www.youtu 	Kerja dan Energi: Menjelaskan Konsep kerja Energi Kinetik Energi Potensial Gravitasi Energi	3%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	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	(TM 12) 4.1 Accuracy in describing work and energy: Ketepatan Menjelaskan kerja dan energi: concept of work, kinetic energy, potential energy (gravity and spring) 5 (TM 12)	<ul style="list-style-type: none"> Mengerjakan latihan soal bersama-sama di buku tentang konsep kerja dan energi Teknik test: Latihan soal & Tugas <p>Criteria: Scoring guidelines Non-test technique:</p> <ul style="list-style-type: none"> Explanation of course material Discussions and questions and answers Practice the problems about the concept of work and energy in the book together <p>Test technique: Exercise & assignment</p>	Gravitasi dan Energi Potensial Pegas <ul style="list-style-type: none"> Latihan soal: Menghitung Kerja Oleh Gaya konservatif dan non konservatif BM: 2x(2x60")	be.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") <ul style="list-style-type: none"> Face-to-face virtual lecture (zoom); [TM: 1x(2x50")] MyITS-Classroom: https://www.y 	Potensial Energi Kinetik <i>Work and Energy: Explain the concept of work kinetic energy potential energy gravity energy kinetic potential energy</i> Pustaka: References: <ul style="list-style-type: none"> Halliday, R., et al, 2014 Dougl 	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				<p><i>nonconservative forces</i></p> <p>BM:2x(2x60")]</p>	<p>outu be.com/watch?v=zVRH9d5PW8g</p> <p>Assignment: Online with MyITS Classroom;</p> <ul style="list-style-type: none"> Exercise: Calculate the work by conservative and nonconservative forces, calculate kinetic energy, potential gravity and potential spring <p>BM:2x(2x60")]</p>	<p>as C. Giancoli, 2014</p> <ul style="list-style-type: none"> Serway, 2004 Tim Dosen Fisika ITS 	
		4.2 Ketepatan menjelaskan kerja dan energi: teorema kerja energi, hukum kekekalan energi mekanik (TM 13)	<p>Kriteria: Pedoman Penilaian</p> <p>Teknik non-test: Penjelasan materi kuliah</p> <p>Diskusi dan tanya-jawab</p>	<ul style="list-style-type: none"> Kuliah: Diskusi, [TM: 1x(2x50")] Tugas: Mengitung tentang hukum kekekalan energi 	<ul style="list-style-type: none"> Kuliah tatap mukadaring (zoom); [TM: 1x(2x50")] MyITS-Classroom: https://www. 	<p>Kerja dan Energi: menjelaskan kerja dan energi: teorema kerja energi, hukum</p>	3%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		4.2 Accuracy in describing work and energy; work-energy theorem, the law of conservation of mechanical energy (TM 13)	<p>Mengerjakan latihan soal bersama-sama di buku tentang hukum kekekalan energi</p> <p>Teknik test: Latihan soal & Tugas</p> <p>Criteria: Scoring guidelines Non-test technique:</p> <ul style="list-style-type: none"> • Explanation of course material • Discussions and questions and answers • Practice the problems about the law of conservation of energy <p>Test technique: Exercise & assignment</p>	<ul style="list-style-type: none"> • Latihan soal: Mengitung tentang hukum kekekalan energi [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")] 	<p>youtu be.com/watch?v=HR5iEX3Sy1k</p> <ul style="list-style-type: none"> • Tugas: Daring dg MyITS Classroom; • Latihan soal: Mengitung tentang hukum kekekalan energi [BM:2x(2x60")] • Face-to-face virtual lecture (zoom); [TM: 1x(2x50")] • MyITS-Classroom: https://www.youtube.com/watc 	<p>kekekalan energi mekanik</p> <p>Work and Energy: Explain about work and energy; work- energy theorem, the law of conservation of mechanical energy</p> <p>Pustaka: References: Halliday, R., et all, 2014 Douglas C. Giancoli, 2014 Serway, 2004</p>	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					<p>h?v=H R5iEX3Sy1k</p> <ul style="list-style-type: none"> • Assignment: Online with MyITS Classroom; • Exercise: Calculate law of conservation of energy BM:2x(2x60") 	Tim Dosen Fisika ITS	
		<p>4.3 Ketepatan menjelaskan Impuls dan Momentum : impuls, momentum, tumbukan (elastis dan tidak elastis), pusat massa; (TM 14)</p> <p>4.3 Accuracy in describing impulse</p>	<p>Kriteria: Pedoman Penilaian</p> <p>Teknik non-test:</p> <ul style="list-style-type: none"> • Penjelasan materi kuliah • Diskusi dan tanya-jawab <p>Mengerjakan latihan soal bersama-samadi buku tentang Impuls dan momentum (tumbukan)</p>	<ul style="list-style-type: none"> • Kuliah: • Diskusi, [TM: 1x(2x50")] • Tugas: Menyelesaikan soal-soal impuls dan momentum, tumbukan lenting sempurna, lenting sebagian dan tidak lenting sama sekali 	<ul style="list-style-type: none"> • Kuliah tatap mukadaring (zoom); [TM: 1x(2x50")] • MyITS-Classroom: https://www.youtube.com/watch?v=pHJQTtEEX4M <p>Tugas: Daring dg</p>	Kerja dan Energi: menjelaskan Impuls dan Momentum :impuls, momentum, tumbukan (elastis dan tidak elastis), pusat massa	3%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		<p>and momentum: impulse, momentum, collision (elastic and inelastic), center of mass; (TM 14)</p>	<p>Teknik test: Latihan soal & Tugas</p> <p>Criteria: Scoring guidelines Non-test technique:</p> <ul style="list-style-type: none"> • Explanation of course material • Discussions and questions and answers • Practice the problems impulse and momentum (collision) <p>Test technique: Exercise & assignment</p>	<ul style="list-style-type: none"> • 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 elastic collision, inelastic collision and perfectly inelastic collision • Exercise: Calculate impulse and 	<p>MyITS Classroom;</p> <ul style="list-style-type: none"> • 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 	<p>Work and energy: describing impulse and momentum, collision (elastic and inelastic), center of mass</p> <p>Pustaka: References:</p> <ul style="list-style-type: none"> • Halliday, R., et al, 2014 • Douglas C. Giancoli, 2014 • Serway, 2004 	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				<p>momentum, object's velocity after perfectly elastic collision inelastic collision and perfectly inelastic collision BM:2x(2x60")]</p>	<p>?v=p HJQTtEEX4M Assignment: Online with MyITS Classroom; • Exercise: Calculate impulse and momentum, object's velocity after perfectly elastic collision inelastic collision and perfectly inelastic collision BM:2x(2x60")]</p>	Tim Dosen Fisika ITS	
	Asistensi (3) Sub-CP MK-3: Mahasiswa memahami azas kerja dan energi mekanik, hukum kekekalan energi mekanik	4.4 Ketepatan dalam menyelesaikan dan menghitung	Kriteria: Pedoman Penskoran (Marking Scheme)	<ul style="list-style-type: none"> Pembahasan soal – soal terkait Kerja dan Energi, Impuls dan 	<ul style="list-style-type: none"> Kuliah oleh asisten melalui tatap muka secara daring; Pembahasan 	Kerja dan Energi: Membahas soal-soal terkait	2%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<p>impuls, momentum, kekekalan momentum, dan menerapkannya kedalam penyelesaian soal</p> <p><i>Assistance (3)</i> <i>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.</i></p>	<p>soal- soal tentang kosep kerja dan energi, impuls dan mometum (TM 15)</p> <p><i>4.4 Accuracy in solving and calculating problems about the concept of work and energy, impulse and momentum (TM 15)</i></p>	<p>Teknik non-test:</p> <ul style="list-style-type: none"> • Tanya-jawab lisan • Menyalin jawaban soal- soal yang dibahas oleh asisten selamaperkuliahan. <p>Teknik test:</p> <ul style="list-style-type: none"> • Keaktifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten <p>Criteria: Scoring guidelines (Marking Scheme)</p> <p>Non-test technique:</p> <ul style="list-style-type: none"> • Oral questions and answers • Transcribe exercises discussed with the assistant during 	<p>Momentum</p> <ul style="list-style-type: none"> • Diskusi, [TM: 1x(2x50")] • Discussing questions related to work and energy, impulse and momentum • Discussion, [TM: 1x(2x50")] 	<p>soal melalui zoom, groupWA dll [TM: 1x(2x50")]</p> <ul style="list-style-type: none"> • <i>Face-to-face online lecture by the assistant;</i> • <i>Discussing questions through zoom, WA group, etc</i> • [TM: 1x(2x50")] 	<p>Menjelaskan kerja dan energi: konsep kerja, energi kinetik, energi potensial (gravitasi dan pegas), teorema kerja energi, hukum kekekalan energi mekanik, Impuls dan Momentum</p> <p><i>Work and energy: Discussing questions about</i></p>	

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			lectures Test technique: <ul style="list-style-type: none"> • Originality and accuracy of answering questions • asked by the assistant 			<p><i>Explaining about work and energy; concept of work, kinetic energy, potential energy (gravity and spring), work-energy theorem, the law of conservation of mechanical energy, impulse and momentum</i></p> <p>Pustaka: References: <ul style="list-style-type: none"> • Halliday, R., et al, 2014 • Douglas </p>	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						C. Giancoli, 2014 • Serway, 2004 Tim Dosen Fisika ITS	
8	Midterm Exam						
9,10	Sub-CPMK5: Mahasiswa mampu memahami konsep benda pejal, menghitung momen inersia, torsi, serta mendemonstrasikannya (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 LLO5: Students are able to understand the concept of solid objects, calculate the moment	1.1 Ketepatan menjelaskan konsep dan teori dinamika rotasi, pusat massa, dan momen inersia, serta penggunaannya 1.2 Ketepatan menerapkan prinsip benda tegar dan gerak menggelinding dalam	Kriteria: Menggunakan rubrik analitik dan pedoman penskoran (Marking Scheme) Teknik non-test: • Meringkas materi kuliah; Teknik test: • Tanya jawab lisan • Latihan menyelesaikan soal-soal dinamika rotasi dan aplikasinya • (Tugas-5:	• 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 Latihan menyelesaikan soal-soal dinamika rotasi [PT+BM:(1+1)x(3x60")]	• Kuliah tatap muka maya (Zoom); • MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=fDJeVR0ow • Diskusi; [TM: 1x(3x50")] • Tugas-1: Menyusun ringkasan kuliah dan menghitung	Dinamika rotasi: Pergeseran sudut, kecepatan sudut dan percepatan sudut, momen gaya (torsi), pusat massa, kesetimbangan momen gaya, momen inersia, energi kinetik rotasi, gerak menggelinding	12%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	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	<p>penyelesaian</p> <p>1.1 Accuracy in describing the concept and theory of rotational dynamics, centre of mass and moment of inertia, as well as the application</p> <p>1.2 Accuracy in applying the principles of rigid body and rolling motion in solving rotational dynamics problems</p>	<p>Problem & Solving)</p> <p>Criteria: Using analytic rubric and scoring guidelines (Marking Scheme)</p> <p>Non-test technique:</p> <ul style="list-style-type: none"> Summarize the lecture material <p>Test technique:</p> <ul style="list-style-type: none"> Oral questions and answers Exercises on rotational dynamics and its application (Assignment-5: Problem & Solving) 	<ul style="list-style-type: none"> 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'')] 	<ul style="list-style-type: none"> Latihan soal Latihan menyelesaikan soal-soal dinamika rotasi [PT+BM:(1+1)x(3x60'')] Face-to-Face virtual lectures (Zoom); MyITS-Classroom Learning resources: 	<p>g, hukum kekekalan energi (translasi dan rotasi)</p> <p>Rotational dynamics: Angular displacement, angular velocity and angular acceleration, moment of force (torque), centre of mass, balance of force moment, moment of inertia, rotational kinetic</p>	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	Face to Face (5)	On-line (6)	(7)	(8)
					https://www.youtube.com/watch?v=fDJeVR0ow <ul style="list-style-type: none"> • 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")] <ul style="list-style-type: none"> • Exercise Exercise on rotational dynamics [PT+BM:(1+1)x(3x60")] 	energy, rolling motion, energy conservation law (translation and rotation) Pustaka: References: <ul style="list-style-type: none"> • Halliday, R., et al, 2014 • Douglas C. Giancoli, 2014 • Serway, 2004 Tim Dosen Fisika ITS	
		1.3 Ketepatan menghitung	Kriteria: Menggunakan rubrik	• Praktikum: Modul-5 (M5):	• Praktikum Mandiri		5%

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		<p>dan mendemonstrasikan dinamika rotasi</p> <p>1.3 Accuracy in calculating and demonstrating rotational dynamics</p>	<p>holistik</p> <p>Teknik non-test:</p> <ul style="list-style-type: none"> 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. <p>Teknik test:</p> <ul style="list-style-type: none"> Tes pendahuluan lisan. Membuat laporan akhir 	<p>Momen Inersia, 7 jam: Tutorial/ Pre-test, Persiapan, Pelaksanaan Praktikum, Penyusunan laporan, Presentasi hasil.</p> <ul style="list-style-type: none"> Practicum: Module-5 (M%): Moment of inertia, 7 hours: Tutorial / Pre-test, Preparation, Practicum implementation, Report preparation, Result presentation. 	<p>Memfaatkan virtual laboratory untuk mempelajari konsep gerak rotasi dari suatu benda, sebagai penggunaan aplikasi PhET (https://phet.colorado.edu/)</p> <ul style="list-style-type: none"> Independent Practicum Use virtual laboratory to learn the concept of rotational motion of an object, for example using PhET 		

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			<ul style="list-style-type: none"> • Presentasi hasil <p>Criteria: Using holistic rubric</p> <p>Non-test technique:</p> <ul style="list-style-type: none"> • 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 		<p>application (https://phet.colorado.edu/)</p>		
		1.4 Ketepatan menghitung penyelesaian soal-	Kriteria: Menggunakan rubrik analitik dan	<ul style="list-style-type: none"> • Diskusi, [TM: 1x(3x50'')] • Latihan soal 	<ul style="list-style-type: none"> • Kuliah dengan asisten 		4%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		soal dinamika rotasi melalui asistensi 1.4 Accuracy in calculating the solutions of rotational dynamics problems through assistance	pedoman penskoran (Marking Scheme) Teknik non-test: • Tanya-jawaban • Latihan soal yang dibahas dengan asisten Teknik test: • Keaktifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten Criteria: Using analytic rubric and scoring guidelines (Marking Scheme) Non-test technique: • Oral questions and	Latihan dan pembahasan penyelesaian soal-soal dinamika rotasi [PT+BM:(1+1)x(3x60")] • Discussion, [TM: 1x(3x50")] • Exercise and discussing the solution of rotational dynamics problems [PT+BM:(1+1)x(3x60")]	melalui tatap muka maya (Zoom); • Diskusi Online (Chatting) pembahasan soal melalui email, group WA, Line, dll. [TM: 1x(3x50")] • Latihan soal dan pembahasan penyelesaian soal-soal dinamika rotasi [PT+BM:(1+1)x(3x60")] • Face-to-face virtual lecture with the assistant		

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			<p>answers</p> <ul style="list-style-type: none"> • Discuss exercise with the assistant <p>Test technique: Originality and accuracy of answering questions asked by the assistant</p>		<p>(Zoom);</p> <ul style="list-style-type: none"> • Online discussion (Chatting) on solving problems by email, WA group, Line, etc [TM: 1x(3x50'')] • Exercise Exercise and discussing the solution of rotational dynamics problems [PT+BM:(1+1)x(3x60'')] 		
11,12	Sub-CPMK 6: Mahasiswa memahami dan mampu menerapkan konsep gerak harmonis sederhana, energi gerak harmonis sederhana, bandul matematis, bandul fisis, bandul penter dan mampu mendemonstrasikannya, serta	1.1 Ketepatan dalam menerangkan secara tulisan dan verbal dengan tepat terhadap konsep energi	<p>Kriteria: Menggunakan rubrik analitik dan pedoman penskoran (Marking Scheme)</p> <p>Teknik non-test:</p> <ul style="list-style-type: none"> • Meringkas materi 	<ul style="list-style-type: none"> • Kuliah: • Diskusi, [TM: 1x(2x50'')] • Tugas-1: Menyusun ringkasan kuliah dan mengerjakan contoh latihan soal yang diberikan dalam 	<ul style="list-style-type: none"> • Kuliah tatap muka maya (Zoom); • MyITS-Classroom: Sumber belajar: https://www.yout 	Getaran: harmonis sederhana, bandul matematis, bandul fisis, bandul penter,	12%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<p>mampu menghitung gabungan getaran selaras (sejajar dan tegak lurus)</p> <p><i>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)</i></p>	<p>pada gerak harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan getaran selaras (sejajar dan tegak lurus)</p> <p>1.2 Kemampuan memberikan contoh penerapan konsep harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan getaran selaras (sejajar dan tegak lurus) dalam</p>	<p>kuliah;</p> <ul style="list-style-type: none"> Memberikan ide sederhana aplikasi <p>Teknik test:</p> <ul style="list-style-type: none"> 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) <p><i>Criteria: Using analytic rubric and scoring guidelines (Marking Scheme)</i></p> <p><i>Non-test technique:</i></p>	<ul style="list-style-type: none"> Kuliah [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: [TM: 1x(2x50'')] Discussion, [TM: 1x(2x50'')] Assignment-1: Summarize the lecture material and working on sample practice questions given in lecture [TM: 1x(2x50'')] 	<p>https://www.youtube.com/watch?v=pKkfmt</p> <p>https://www.youtube.com/watch?v=aMas-Z8K2-l</p> <p>https://www.youtube.com/watch?v=00IJCnMQE</p> <p>https://www.youtube.com/watch?v=NN--nwtXrsw</p> <p>https://www.youtube.com/watch?v=X6HzOrPzxvc</p> <p>https://www.youtube.com/watch?v=cj4XTyW6ums</p> <p>Diskusi; Tugas-1:</p>	<p>gabungan getaran selaras (sejajar dan tegak lurus)</p> <p><i>Vibrations: simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular)</i></p>	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		<p>kehidupan sehari-hari</p> <p>1.1 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)</p> <p>1.2 Ability to provide examples on the application of the concept of simple</p>	<ul style="list-style-type: none"> Summarize the lecture material Provide simple application idea <p>Test technique:</p> <ul style="list-style-type: none"> Oral questions and answers Exercises on simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular) Assignment-1: Problem & Solving 	<p>[PT+BM:(1+1)x(2x60")]</p> <ul style="list-style-type: none"> Exercise Exercises on simple harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular) <p>[PT+BM:(1+1)x(2x60")]</p>	<p>Menyusun ringkasan kuliah dan mengerjakan contoh latihan soalnya yang diberikan dalam kuliah [PT+BM:(1+1)x(2x60")]</p> <ul style="list-style-type: none"> Latihan soal menyelesaikan soal-soal aplikasi harmonis sederhana, bandul matematis, bandul fisis, bandul puntir, gabungan getaran selaras (sejajar dan tegak lurus) <p>[PT+BM:(1+1)x(2x60")]</p>	<p>Pustaka: References:</p> <ul style="list-style-type: none"> Halliday, R., et al, 2014 Douglas C. Giancoli, 2014 Serway, 2004 Tim Dosen Fisika ITS 	

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		<p><i>harmonic motion, mathematical pendulum, physical pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular) in everyday life.</i></p>			<ul style="list-style-type: none"> • Face-to-face virtual lecture (Zoom); • MyITS-Classroom: Learning resources: https://www.youtube.com/watch?v=pKKfmthLNmQ https://www.youtube.com/watch?v=aMas-Z8K2-I https://www.youtube.com/watch?v=o0IJCnMQE https://www.youtube.com/watch?v=NN--nwtXrsw https://www.youtube.com/watch?v=NN--nwtXrsw 		

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					utube.com/watch?v=X6Hz0rPzxvc https://www.youtube.com/watch?v=cj4XTyW6ums <ul style="list-style-type: none"> • Discussion, [TM: 1x(2x50'')] • Assignment-1: Summarize the lecture material and working on sample practice questions given in lecture [PT+BM:(1+1)x(2x6 0'')] • Exercise Exercises on simple harmonic motion, mathematical pendulum, physical 		

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					pendulum, torsional pendulum, combination of harmonious vibrations (parallel and perpendicular) [PT+BM:(1+1)x(2x60'')]		
	<p>Praktikum Mampu menggunakan getaran, hukum Hooke pada konsep bandul matematis dan bandul fisis.</p> <p><i>Practicum</i> Able to use vibrations, Hooke law on the concepts of mathematical and physical pendulum.</p>	<p>1.3. Ketepatan menghitung dan mendemonstrasikan terkait perbedaan matematis dan bandul fisis.</p> <p>1.3. Accuracy in calculating and demonstrating differences between mathematical</p>	<p>Kriteria: Rubrik</p> <p>Modul praktikum Fisika Dasar 1</p> <p>Teknik non-test:</p> <ul style="list-style-type: none"> Praktikum di dampingi oleh asisten lab. Mencatat Data hasil praktikum, acc asisten. <p>Teknik non-test:</p> <ul style="list-style-type: none"> Tes pendahuluanlesan. 	<ul style="list-style-type: none"> Praktikum: Modul G1 dan G2 : Bandul matematis dan Bandul Fisis 7 jam: Tutorial / Pre- test, Persiapan, Pelaksanaan Praktikum, Penyusunan laporan, Presentasi hasil. Practicum: Module G1 and G : Mathematical and 	<ul style="list-style-type: none"> Praktikum Mandiri Menggunakan program animasi yang telah disiapkan oleh TIM ITS Independent practicum using animation programs prepared by 		5%

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	Face to Face (5)	On-line (6)	(7)	(8)
		<i>and physical pendulum.</i>	<ul style="list-style-type: none"> • Laporan akhir • Presentasi <p><i>Criteria: Rubric Physics 1 Practicum module Non-test technique:</i></p> <p><i>Practicum assisted by laboratory assistant</i></p> <ul style="list-style-type: none"> • Record data on practicum results, acc assistant <p><i>Test technique:</i></p> <ul style="list-style-type: none"> • Oral preliminary test • Final report Presentation 	<i>physical pendulum 7 hours: Tutorial /Pre-test, Preparation, Practicum implementation, Report preparation, Result presentation.</i>	<i>ITS Team</i>		
	Asistensi mampu menerapkan konsep gerak harmonis sederhana, energi gerak harmonis sederhana, bandul	1.4 Ketepatan menghitung penyelesaian soal- soal berkenaan	Kriteria: Pedoman Penskoran (Marking Scheme)	<ul style="list-style-type: none"> • Pembahasan soal – soal berkenaan energi osilasi dan gabungan 	<ul style="list-style-type: none"> • Pembahasan soal – soal tatap maya (Zoom, melalui group WA, LINE, dll.) 		3%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<p>matematis, bandulfisis, bandul puntir serta mampu menghitung gabungan getaran selaras (sejajar dan tegak lurus)</p> <p><i>Assistance</i> 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)</p>	<p>dengan konsep gabungan dua getaran selaras dantegak lurus.</p> <p>1.4 Accuracy in calculating the problem solutionsrelated to the concept of combining two harmonious and perpendicular motion</p>	<p>Teknik non-tes:</p> <ul style="list-style-type: none"> • Tanya-jawablisn • Menyalin jawaban soal- soal yang dibahas oleh asisten selama perkuliahan. <p>Teknik tes:</p> <ul style="list-style-type: none"> • Keatifan dan ketepatan jawaban atas pertanyaan yang diajukanoleh asisten <p>Criteria: Scoring guidelines (Marking Scheme)</p> <p>Non-test technique:</p> <ul style="list-style-type: none"> • Oral questionsand answers 	<p>dua getaran baik selaras maupun tegak lurus.</p> <ul style="list-style-type: none"> • Diskusi, [TM: 1x(3x50'')] <p>Discussing questions related to oscillation energy and combination oftwo vibrations both harmonious and perpendicular</p> <ul style="list-style-type: none"> • Discussion, [TM: 1x(3x50'')] 	<p>berkenaan dengan energi osilasi dan gabungan dua getaran [TM: 1x(3x50'')]</p> <ul style="list-style-type: none"> • MyITS-Classroom: Sumber belajar: • Discussing questions virtually (Zoom, through WA group, Line, etc) about oscillation energy and combination oftwo vibrations [TM: 1x(3x50'')] • MyITS- 		

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			<ul style="list-style-type: none"> • <i>Transcribe exercises discussed with the assistant during lectures</i> <p><i>Test technique: Originality and accuracy of answering questions asked by the assistant</i></p>		Classroom: Learning resources:		
13,14	<p>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 kontinuitas dan Bernoulli.</p> <p><i>LLO7: Able to use the concept of elasticity, hydrostatic theory</i></p>	<p>1.5 Ketepatan menjelaskan tentang konsep elastisitas, teori hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan dan Kapilaritas</p> <p>1.6 Ketepatan menghitung penyelesaian soal- soal berkenaan dengan</p>	<p>Kriteria: Pedoman Penskoran (<i>Marking Scheme</i>) Teknik non-tes:</p> <ul style="list-style-type: none"> • Meringkas materi kuliah • Tanya-jawablisian • Menyalin contoh soal <p>Teknik tes: Latihan soal</p>	<ul style="list-style-type: none"> • 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(3x5 	<ul style="list-style-type: none"> • Kuliah tatap muka maya (Zoom); • Diskusi; [TM: 1x(3x50”)] • Tugas: Menyusun ringkasan kuliah dan menghitung berkenaan teori elastisitas, hidrostatis, prinsip Pascal, Archimedes, Tegangan 	<p>Mekanika fluida: elastisitas, tekanan hidrostatis ,prinsip Pascal, prinsip Archimedes ,tegangan permukaan dan kapilaritas</p> <p><i>Fluid</i></p>	5 %

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	which includes: hydrostatic pressure, Pascal's principle, Archimedes, Surface Tension and Capillary. Able to use hydrodynamic concepts which include: continuity and Bernoulli equations	<p>elastisitas, hidrostatis, prinsip Pascal, Archimedes, dan Tegangan Permukaan</p> <p>1.7 Ketepatan menghitung dan mendemonstrasikan viskositas cairan</p> <p>1.5 Accuracy in explaining the concept of elasticity, hydrostatic theory, Pascal principle, Archimedes, surfacetension and capillarity</p> <p>1.6 Accuracy in calculating the problems solutions</p>	<p>Kriteria: Rubrik Modul praktikum Fisika Dasar 1</p> <p>Teknik non-tes:</p> <ul style="list-style-type: none"> Praktikum di dampingi oleh asisten lab. Mencatat Data hasil praktikum, acc asisten. <p>Teknik non-tes:</p> <ul style="list-style-type: none"> Tes pendahuluan lisan. Laporan akhir Presentasi <p>Criteria: Scoring guidelines (Marking Scheme) Non-test technique:</p> <ul style="list-style-type: none"> Summarize the lecture material 	<p>0”]]</p> <p>Modul: Viskositas cairan 7 jam: Tutorial / Pre-tes, Persiapan, Pelaksanaan Praktikum, Penyusunan laporan, Presentasi hasil.</p> <ul style="list-style-type: none"> Lecture: Discussion, [TM: 1mgx(3skx50”)] 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(3x5 	<p>Permukaan, dan Kapilaritas</p> <ul style="list-style-type: none"> [PT+BM:(1+1)x(3x50”)] 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 	<p>mechanics: elasticity, hydrostatic pressure, Pascal principle, Archimedes, surface tension and capillarity</p>	

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		<p>related to elasticity, hydrostatic theory, Pascal principle, Archimedes, and surface tension</p> <p>1.7 Accuracy in calculating and demonstrating fluid viscosity</p>	<ul style="list-style-type: none"> • Oral questions and answers • Transcribe exercise <p>Test technique: Exercise</p> <p>Criteria: Rubric Physics 1 Practicum module Non-test technique:</p> <ul style="list-style-type: none"> • Practicum assisted by laboratory assistant • Record data on practicum results, acc assistant <p>Test technique:</p> <ul style="list-style-type: none"> • Oral preliminary test • Final report Presentation 	<p>0"]]</p> <p>Modul: Fluid viscosity 7 hours: Tutorial / Pre-test, Preparation, Practicum implementation, Report preparation, Result presentation.</p>	<p>lecture summary and doing calculation related to elasticity, hydrostatic, Pascal principle, Archimedes, surface tension and capillarity [PT+BM:(1+1)x(3x50"]]</p>		
	Asistensi	1.8 Ketepatan	Kriteria:	• Pembahasan soal –	• Pembahasan	Mekanika	2%

Mg Ke- / Week	Kemampuan akhir tiap tahapan belajar (Sub- CPMK) / Final ability of each learning stage (LLO)	Penilaian / Assesment		Bentuk 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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<p>Mampu menggunakan konsep dan teori hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan, Bernoulli dalam menyelesaikan masalah-masalah mekanika fluida</p> <p><i>Assistance</i> Able to use hydrostatic concept and theory, Pascal's principle, Archimedes, Bernoulli in solving fluid mechanics problems</p>	<p>menghitung penyelesaian soal- soal berkenaan dengan konsep dan teori hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan, Bernoulli</p> <p>1.8 1.8 Accuracy in calculating the problem solutions related to hydrostatic concept and theory, Pascal's principle, Archimedes, Bernoulli</p>	<p>Pedoman Penskoran (Marking Scheme)</p> <p>Teknik non-tes:</p> <ul style="list-style-type: none"> • Tanya-jawab lisan • Menyalin jawaban soal- soal yang dibahas oleh asisten selama perkuliahan. <p>Teknik tes: Keaktifan dan ketepatan jawaban atas pertanyaan yang diajukan oleh asisten</p> <p>Criteria: Scoring guidelines</p> <p>(Marking Scheme)</p> <p>Non-test</p>	<p>soal berkenaan teori elastisitas, hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan, Bernoulli dalam menyelesaikan masalah-masalah mekanika fluida</p> <ul style="list-style-type: none"> • Diskusi, [TM: 1x(3x50'')] • Discussing questions related to elasticity theory, hydrostatic, Pascal's principle, Archimedes, Surface Tension, Bernoulli in solving fluid mechanics problems • Discussion, [TM: 1x(3x50'')] 	<p>soal – soal tatap maya (Zoom, melalui group WA, LINE, dll.) berkenaan dengan teori hidrostatis, prinsip Pascal, Archimedes, Tegangan Permukaan, Bernoulli dalam menyelesaikan masalah-masalah mekanika fluida</p> <p>[TM: 1x(3x50'')]</p> <ul style="list-style-type: none"> • MyITS-Classroom: Sumber belajar: https://www.youtube.com/watch?v=UJ3-Zm1wbIQ 	<p>fluida: elastisitas, tekanan hidrostatis, prinsip Pascal, prinsip Archimedes, tegangan permukaan, persamaan kontinuitas, persamaan Bernoulli, viskositas</p> <p>Fluid mechanics: elasticity, hydrostatic pressure, Pascal principle, Archimedes, surface tension,</p>	

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	Face to Face (5)	On-line (6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			technique: <ul style="list-style-type: none"> Oral questions and answers Transcribe exercises discussed with the assistant during lectures Test technique: Originality and accuracy of answering questions asked by the assistant		<i>Discussing questions virtually (Zoom, through WA group, Line, etc) about hydrostatic concept and theory, Pascal's principle, Archimedes, Bernoulli in solving fluid mechanics problems [TM: 1x(3x50")]</i> <ul style="list-style-type: none"> MyITS-Classroom: Learning resources: https://www.youtube.com/watch?v 	<i>continuity equation, Bernoulli equation and viscosity</i>	

Mg Ke- / Week	Kemampuan akhir tiap tahap belajar (Sub- CPMK) / <i>Final ability of each learning stage (LLO)</i>	Penilaian / <i>Assesment</i>		Bantuk Pembelajaran; Metode Pembelajaran; Penugasan Mahasiswa; / <i>Form of Learning; Learning Method; Student Assignment;</i>		Materi Pembelajar an / <i>Learning Material</i>	Bobot Penilaian (%) / <i>Assesment Load (%)</i>
		Indikator / <i>Indicator</i>	Kriteria & Teknik / <i>Criteria & Techniques</i>				
(1)	(2)	(3)	(4)	Face to Face (5)	On-line (6)	(7)	(8)
					=UJ3- Zm1wblQ		
15,16	Final Exam						