Semester Lesson Plan

	UNIVERSITAS NEGERI SURABAYA **FACULTY OF MATHEMATICS AND NATURAL SCIENCES** **PHYSICS EDUCATION STUDY PROGRAM**	**Document Code**

SEMESTER LESSON PLAN

COURSES	**CODE**	**Course Classrom**	**The weight of the semester credit system**		**SEMESTER**	**Compilation date**
BASIC PHYSICS I			**T=3**	**P=0**	1	11 Desember 2019

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Program Learning Outcomes (PLO)	**PLO in the Course**	
	PLO1	Demonstrate their knowledge of classical physics and modern physics
	PLO10	Work as an individual as well as a team effectively, have an entrepreneur skills, and awareness of environmental issues
	PLO11	Demonstrate good scientific manners, critical thinking, and innovation skills in educational, research, and professional fields
	Course Learning Outcomes (CLO)	
	CLO1	Be able to explain basic concepts and principles of kinematics, particle dynamics and rotation, vibration, heat transfer, and thermodynamics.
	CLO2	Mastering the material, structure, and concepts of physical science and its application in technology.
	CLO3	Using basic physics concepts and proper mathematical methods to get solutions to quantitative problems in physics.
	CLO4	Able to work in groups in the discussion process related to the mechanics and thermodynamics concepts that are being discussed during the lesson.
	Sub-Course Learning Outcomes (Sub-CLO)	
	Sub-CLO1	Students are able to explain the concept of particle kinematics and can solve the problems of particle kinematics.
	Sub-CLO2	Students are able to explain the concept of particle dynamics.

	Sub-CLO3	Students are able to explain the concept of work and energy.
	Sub-CLO4	Students are able to explain the concept of rotational dynamics and its calculations.
	Sub-CLO5	Students are able to explain the concepts of vibration, and are skilled at performing calculations related to vibration.
	Sub-CLO6	Students are able to explain the mechanical concept of shape–changing objects.
	Sub-CLO7	Students are able to explain the concepts of thermometry and calorimetry.
	Sub-CLO8	Students are able to explain the concept of heat transfer.
	Sub-CLO9	Students are able to explain tha concepts of thermodynamics and entropy.
A Short Course Description	The study of quantities, units and measurements, particle kinematics (one, two and three dimensional motion), particle dynamics (Newton's laws and their use, work and energy, linear momentum and collisions), rotational dynamics (rotation of rigid bodies, angular momentum and force moments , rigid body equilibrium), harmonious vibrations, universal laws of gravity, fluid mechanics, mechanical waves (sound waves, superposition and standing waves), thermophysics (temperature, expansion and ideal gases, heat) and the laws of thermodynamics I (kinetic theory of gases) and laws thermodynamics II (heat engine, ethropy) by observing physical phenomena in everyday life and analyzing them by applying learned physics concepts, problem solving, guided discovery	
Learning Materials	1. Kinematics and particle dynamics, work and energy as well as rotational dynamics 2. Vibration and deformation mechanics (hydrostatics and hydrodynamics) 3. Thermometry and calorimetry, heat transfer, thermodynamics and entropy	
References	**Main references :**	
	[1]. Sarojo, A.G., 2014, *Seri Fisika Dasar Mekanika*, edisi 5, Salemba Teknika. [2]. Halliday & Resnick, 2007, *Fisika Jilid 1*, Erlangga [3]. Serway, R.A., and Jewett, J.W., 2010, *Physics for Scientists and Engineers with Modern Physics*, Salemba Teknika	
	Supported references :	
	[4]. Bueche, F.J., 2000, *Schaum's Outline of College Physics*, McGraw-Hill.	
Lecturers	Dr. Z.A. Imam Supardi, M.Si Woro Setyarsih, S.Pd., M.Si Dra. Suliyanah, M.Si Diah Hari Kusumawati, M.Si Drs. Dwikoranto, M.Pd Nugrahani Primary Putri, M.Si Dr. Titin Sunarti, M.Si. Mukhayyarotin Niswati Rodliyatul Jauhariyah, M.Pd. Utama Alan Deta, S.Pd., M.Pd., M.Si. Dr. Binar Kurnia Prahani, M.Pd.	

Requirements course	-						
Week-	**Course Learning Outcomes (Sub-CLO)**	**Assessment**		**Learning Forms, Learning methods, Student Assignment, [Estimated time]**		**Learning materials [References]**	**The weight of assessment (%)**
		Indicator	**Criteria&Form**	**offline**	**online**		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
1	Students are able to understand the concept of particle kinematics	1. Students are able to explain the concept of particle kinematics and 2. Students can solve particle kinematics problems	**Criteria:** Quantitative **Form:** test	**Form:** Lecture **Method:** • Discussion • Problem solving Assignment: Independent task Estimated time: 3x50 minutes	**-**	Particle kinematics: • Quantities, units and vectors • Straight motion • Curved motion • Relative motion References: [1] Chapters 1-2 [3] Chapters 2-4 [4] Ch.1	**5%**
2-3	Students are able to understand the concept of particle dynamics	1. Students are able to explain the concept of particle dynamics 2. Students can solve particle dynamics problems	**Criteria:** Quantitative **Form:** test	**Form**: Lecture **Method:** • Discussion • Problem solving Assignment: Independent task **Estimated time**: 6x50 minutes	**-**	Particle dynamics: • Newton's laws of motion • Friction • Centripetal force • Gravity References: [1] Chapters 2-3 [3] Chapters 5-6	**10%**

4-5	Students are able to understand the concept of work and energy	1. Students are able to explain the concept of work and energy 2. Students can solve problems related to work and energy descriptions	**Criteria:** Quantitative **Form:** test	**Form**: Lecture **Method:** • Discussion • Problem solving Assignment: Independent task **Estimated time**: 6x50 minutes	**-**	Work and energy: • Fix force • Work by fix force • Work by conservative force • Work by non conservative force • Kinetic energy • Potential energy • Power • Impulses and linear momentum • Motion of the center of mass References: [1] Chapter 3 [3] Chapters 7-10	**5%**
6-7	Students are able to understand the concept of rotation dynamics	Students are able to explain the concept of rotation dynamics and their calculations	**Criteria:** Quantitative **Form:** test	**Form**: Lecture **Method:** • Discussion • Problem solving Assignment: Independent task **Estimated time**: 6x50 minutes		Rotation dynamics: • Rotational motion vector • Angular momentum and moment of force • Moment of inertia • Motion of rigid objects • Conservation of angular momentum • Rigid body balance References: [1] Chapter 6 [3] Chapter 11-	**10%**
8	**Mid-Semester Evaluation / Mid-Semester Examination**						**20%**

9-10	Students are able to understand the concept of vibration	1. Students are able to explain the concept of vibration, and 2. Students are skilled at doing calculations related to vibration	**Criteria:** Quantitative **Form:** test	**Form**: Lecture **Method:** • Discussion • Problem solving Assignment: Independent task **Estimated time**: 6x50 minutes		Vibration: • The vibration equation is in tune • Vibration power in harmony • Examples of vibrations • Combined two vibrations in tune • Vibration is harmoniously muffled References: [1] Chapter 4 [3] Chapter 15	**5%**
11	Students are able to understand the mechanical concept of shape-changing objects	Students are able to explain the mechanical concept of shape-changing objects	**Criteria:** Quantitative **Form:** test	**Form**: Lecture **Method:** • Discussion • Problem solving Assignment: Independent task **Estimated time**: 6x50 minutes	**-**	The mechanics of deforming objects: • Elasticity • Hydrostatics • Hydrodynamics References: [1] Chapter 7 [3] 17-18	**5%**
12	Students are able to understand the concepts of thermometry and calorimetry	Students are able to explain the concepts of thermometry and calorimetry	**Criteria:** Quantitative **Form:** test	**Form**: Lecture **Method:** • Discussion • Problem solving Assignment:	**-**	Thermometry and calorimetry: • The concept of temperature • Temperature scale • Various kinds of thermometers • Expansion	**5%**

				Independent task **Estimated time**: 6x50 minutes		• Heat concept • The Black Principle • Calorimetry References: [2] Chapter 21 [4] Ch.3	
13	Students are able to understand the concept of heat transfer	1. Students are able to explain the concept of heat transfer	**Criteria:** Quantitative **Form:** Non test	**Form**: Lecture **Method:** • Discussion • Problem solving Assignment: Independent task **Estimated time**: 6x50 minutes	**-**	Heat Transfer: • Conduction • Convection • Radiation References: [2] Chapter 22 [4] Ch.3	**5%**
14-15	Students are able to understand thermodynamic concepts	Students are able to explain the concepts of thermodynamics and entropy	**Criteria:** Quantitative **Form:** Non test	**Form**: Lecture **Method:** • Discussion • Problem solving Assignment: Independent task **Estimated time**: 6x50 minutes		Thermodynamics: • Macroscopic and microscopic description • The 0-th law of thermodynamics • The kinetic theory of gases • Heat and work • The first law of thermodynamics • Ideal gas heat capacity • 2nd law of thermodynamics • Entropy References:	**10%**

						[2] Chapters 23-25	
16	**Final Semester Evaluation / Final Semester Examination**						**20%**