

Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Bachelor of Science Education Study Program

Document Code

SEMESTER LEARNING PLAN

Courses				CODE		Course F	amily		Cred	lit Wei	ght	SEMESTER	Compilation Date
Substan	ce an	d Energy		8420103158					T=3	P=0	ECTS=4.77	0	July 19, 2024
AUTHOR	RIZAT	ION		SP Developer		•		Cours	e Clus	ster Co	oordinator	Study Progr Coordinator	am
												Prof. Dr. E	rman, M.Pd.
Learning model	J	Case Studies											
Program	n	PLO study pr	ogram	that is charged	l to the cours	se							
Outcom	g es	Program Obj	ectives	(PO)									
(PLO)		PLO-PO Matr	ix										
		P.O PO Matrix at the end of each learning stage (Sub-PO)											
		PO Matrix at	the end	of each learni	ng stage (Su	ib-PO)							
	P.O Week												
				1 2	3 4 5	6	7 8	9	10	11	L 12 1	13 14 1	.5 16
Short Course Descript	tion	This course dis through theory	scusses † & practio	the properties of ce to solve proble	a substance, ms and their a	temperatur application	re, heat in every	& expa day life.	nsion,	therm	odynamics, f	orms of energ	/ and changes
Referen	ces	Main :											
		1. Washin 2. the Na 3. http://w 4. Mc Gra 5. Mc Gra	ngton : T 	2004. Advanced he National Acad 2004. Material C ademic ress e.k12.ut.us/curr/s . 2005. The Natu . 2005. Chemistry	I Energetic M lemic Press jount : The cas science/sciber(re Of Matter. C y. Columbus: I	laterials. C se For Mat 20/8th/matt Columbus: United Stat	Comuttee terial Flo er/scibe United S es Of A	on adva ows Ana r/chang States C merica.	anced Ilysis, e.htm Df Ame	Enerç Divisio erica.	jetic Material on on Earth a	s and techno nd Life Studie	logies Bocvel. s. Washington
		Supporters:											
				1									
Supporting Iecturer Ernita Vika Aulia, S.Pd., M.Pd. Ernita Vika Aulia, S.Pd., M.Pd.													
Week-	Fina eac stag	al abilities of h learning ge		Evalu	Evaluation		Help Learning, Learning methods, Lear Student Assignments, mat [Estimated time]		Learning materials [References	Assessment Weight (%)			
	(Su	J-PO)		Indicator	Criteria &	Form	Offli offli	ne(ne)	0	nline	(online)	1	
(1)		(2)		(3)	(4)		(5	5)		(6)	(7)	(8)

1	Able to make	1.Identifying forms	Criteria:	Student-		0%
	decisions based	of	1.Score	centered		
	and data	matter/substances	2.Rubric	learning		
	analysis and	2.Analyze phase	3.4 1 The presentation	(student-		
	in choosing	3 Analyzing	was carried out	centered		
	alternative	changes in the	coherently with	learning)		
	3010110113.	state of a	appropriate	learning		
		substance	intonation and	method		
			assisted by ppt	Strategy		
			media according	discussions		
			to media criteria,	and		
			the answer from	presentations		
			was correct.	3 × 50		
			formulating			
			suggestions for			
			5.3			
			6.The presentation			
			was carried out			
			coherently with			
			but did not			
			emphasize the			
			important			
			research with			
			the help of ppt			
			media according			
			to media criteria,			
			the guestioner			
			were generally			
			correct,			
			suggestions for			
			improvement			
			7.2			
			8.The presentation			
			was not coherent			
			and/or did not			
			emphasize			
			aspects of the			
			research, was			
			assisted by ppt			
			media but did not			
			criteria, the			
			answers from the			
			questioner were			
			incorrect,			
			formulated			
			suggestions for			
			9.1			
			10.The			
			presentation was			
			carried out, but			
			and/or did not			
			emphasize			
			important			
			research. was			
			not assisted by			
			ppt media, the			
			answer from the			
			incorrect, unable			
			to formulate			
			suggestions for			
			improvement			

2	Able to make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	 I.Identifying forms of matter/substances Analyze phase diagrams Analyzing changes in the state of a substance 	Criteria: 1.Score 2.Rubric 3.4 4.The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement 5.3 6.The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement 7.2 8.The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not emphasize important aspects of the research, was assisted by ppt media but did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10.The	Student- centered learning approach (student- centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50		0%
			nietra but du ha meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement			

3	Able to make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	 I.Identifying forms of matter/substances Analyze phase diagrams Analyzing changes in the state of a substance 	 Criteria: Score Rubric A The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement C.The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement Z.2 The presentation was carried out, was not coherent and/or did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement Z.2 The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement D. The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 	Student- centered learning approach (student- centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50		0%
			and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement			

4	Master theoretical concepts in the field of substances and energy in depth and formulate them in solving problems procedurally. Able to utilize science and technology in the field of substances and energy and able to adapt to situations faced in solving problems	 Explain the concepts of temperature and heat Identify and analyze the expansion of a substance 	 Criteria: Score Rubric A The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement S.3 The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement Z.2 The presentation was carried out, was not coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement Z.2 The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by pt 	Student- centered learning approach (student- centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50		0%
			and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement			

	theoretical concepts in the field of substances and energy in depth and formulate them in solving problems procedurally. Able to utilize science and technology in the field of substances and energy and able to adapt to situations faced in solving problems	concepts of temperature and heat 2.Identify and analyze the expansion of a substance	 1.Score 2.Rubric 3.4 4. The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement 5.3 6. The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement 7.2 8. The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10. The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10. The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement 	centered learning approach (student- centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50			
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6	Master theoretical	1.Explain the concepts of	Criteria: 1.Score	Student- centered		0%
	field of substances and	temperature and heat	2.Rubric 3.4	learning approach (studopt		
	energy in depth and formulate	2.Identify and	4.The presentation was carried out	centered		
	them in solving problems	expansion of a	coherently with	learning) Deductive		
	procedurally. Able to utilize	substance	appropriate intonation and	learning		
	science and technology in the		emphasis,	Strategy		
	field of substances and		media according	Lectures, discussions		
	energy and able to adapt to		to media criteria, the answer from	and presentations		
	situations faced in solving		the questioner was correct.	3 X 50		
	problems		formulating			
			improvement			
			5.3 6.The presentation			
			was carried out			
			intonation and			
			but did not			
			important			
			aspects of the research, with			
			the help of ppt			
			to media criteria,			
			the answers from the guestioner			
			were generally			
			formulating			
			suggestions for improvement			
			7.2 8 The presentation			
			was carried out,			
			was not coherent and/or did not			
			emphasize			
			aspects of the			
			research, was assisted by ppt			
			media but did not			
			criteria, the			
			answers from the questioner were			
			generally			
			formulated			
			suggestions for improvement			
			9.1 10 Tho			
			presentation was			
			carried out, but was not coherent			
			and/or did not			
			important			
			aspects of the research, was			
			not assisted by			
			answer from the			
			questioner was incorrect, unable			
			to formulate			
			improvement			
		1			1	

7	Master	1.Explain the	Criteria:	Student-		0%
	theoretical	concepts of	1.Score	centered		
	field of	temperature and	2.Rubric	learning		
	substances and	heat	3.4	approach		
	energy in depth	2.Identify and	4.The presentation	centered		
	them in solving	analyze the	was carried out	learning)		
	problems		appropriate	Deductive		
	Able to utilize	Substance	intonation and	learning		
	science and		emphasis,	Strategy		
	field of		assisted by ppt	Lectures.		
	substances and		media according	discussions		
	energy and able		to media criteria,	and		
	situations faced		the answer from	presentations		
	in solving		was correct	3 × 50		
	problems		formulating			
			suggestions for			
			improvement			
			5.3			
			6.The presentation			
			coherently with			
			intonation and			
			but did not			
			emphasize the			
			important			
			aspects of the			
			the help of pot			
			media according			
			to media criteria,			
			the answers from			
			the questioner			
			were generally			
			formulating			
			suggestions for			
			improvement			
			7.2			
			8.The presentation			
			was carried out,			
			and/or did not			
			emphasize			
			important			
			aspects of the			
			research, was			
			media but did not			
			meet the media			
			criteria, the			
			answers from the			
			questioner were			
			generally			
			formulated			
			suggestions for			
			improvement			
			9.1 10 The			
			LU. The			
			carried out but			
			was not coherent			
			and/or did not			
			emphasize			
			important			
			research was			
			not assisted by			
			ppt media, the			
			answer from the			
			questioner was			
			incorrect, unable			
			suggestions for			
			improvement			

8	Mastering theoretical concepts in the field of matter and energy in depth and formulating them in procedural problem solving	 Identifying forms of matter/substances analyze phase diagrams Analyzing changes in the state of a substance Explain the concepts of temperature and heat Identify and analyze the expansion of a substance Explain the concept of thermodynamics Analyzing thermodynamics in everyday life 	Criteria: 1.4: correct description 2.3: the description is generally correct, there is one aspect where the explanation is incorrect 3.2: the description is generally correct, there is more than one aspect where the explanation is incorrect 4.1: the description is wrong	student- centered learning (student- centered learning) 3 X 50			0%
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9	Able to make	1.Explain the	Criteria:	Student-		0%
	decisions based	meaning of	1.Score	centered		
	and data	mechanical	2.Rubric	learning		
	analysis and	energy		(student-		
	in choosing	2.Determines the	4. The presentation	centered		
	alternative	mechanical	coherently with	learning)		
	solutions.	energy for various	appropriate	Deductive		
		states of an object	intonation and	method		
		3.Explain the law of	emphasis,	Strategy		
		conservation of	media according	Lectures,		
		4.Identify 13 forms	to media criteria,	and		
		of energy that	the answer from	presentations		
		occur in everyday	the questioner	3 X 50		
		life. For example:	was correct,			
		energy in	suggestions for			
		earthquakes, roll	improvement			
		coasters	5.3			
			6.The presentation			
			coherently with			
			intonation and			
			but did not			
			emphasize the			
			important aspects of the			
			research. with			
			the help of ppt			
			media according			
			to media criteria,			
			the questioner			
			were generally			
			correct,			
			formulating			
			suggestions for			
			7.2			
			8.The presentation			
			was carried out,			
			was not coherent			
			emphasize			
			important			
			aspects of the			
			research, was			
			media but did not			
			meet the media			
			criteria, the			
			answers from the			
			generally			
			incorrect,			
			formulated			
			suggestions for			
			9.1			
			10.The			
			presentation was			
			carried out, but			
			and/or did not			
			emphasize			
			important			
			aspects of the			
			not assisted by			
			ppt media, the			
			answer from the			
			questioner was			
			incorrect, unable			
			suggestions for			
			improvement			
		1	1	1		

10	Able to make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	 Explain the meaning of mechanical energy Determines the amount of mechanical energy for various states of an object Explain the law of conservation of energy that occur in everyday life. For example: various forms of energy in earthquakes, roll coasters 	Criteria: 1.Score 2.Rubric 3.4 4.The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement 5.3 6.The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement 7.2 8.The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not met the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not met the media criteria, the answers from the questioner was incorrect, formulated suggestions for improvement 9.1 10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestors for improvement	Student- centered learning approach (student- centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50			0%
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11	Able to make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	 Explain the meaning of mechanical energy Determines the amount of mechanical energy for various states of an object Explain the law of conservation of energy Identify 13 forms of energy that occur in everyday life. For example: various forms of energy in earthquakes, roll coasters 	Criteria: 1.Score 2.Rubric 3.4 4.The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement 5.3 6.The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement 7.2 8.The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not met the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10.The presentation was carried out, but was not coherent and/or did not met the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement	Student- centered learning approach (student- centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50			0%
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12	Able to make	1.Explain the	Criteria:	Student-			0%
	decisions based	meaning of	1.Score	centered			
	and data	mechanical	2.Rubric	learning			
	analysis and	energy	3.4	approacn (student-			
	in choosing	2.Determines the	4.The presentation	centered			
	alternative	amount of mechanical	coherently with	learning)			
	solutions.	energy for various	appropriate	Deductive			
		states of an object	intonation and	nethod			
		Explain the law of	emphasis,	Strategy			
		conservation of	assisted by ppt	Lectures,			
		energy A Identify 12 forms	to media according	discussions			
		of energy that	the answer from	presentations			
		occur in everyday	the questioner	3 X 50			
		life. For example:	was correct,				
		various forms of	formulating				
		energy in earthquakes, roll	improvement				
		coasters	5.3				
			6.The presentation				
			was carried out				
			coherently with				
			but did not				
			emphasize the				
			important				
			aspects of the				
			the help of pot				
			media according				
			to media criteria,				
			the answers from				
			the questioner				
			correct				
			formulating				
			suggestions for				
			improvement				
			7.2 8 The presentation				
			was carried out,				
			was not coherent				
			and/or did not				
			emphasize				
			aspects of the				
			research, was				
			assisted by ppt				
			media but did not				
			criteria, the				
			answers from the				
			questioner were				
			generally				
			formulated				
			suggestions for				
			improvement				
			9.1 10 The				
			LU.The presentation was				
			carried out. but				
			was not coherent				
			and/or did not				
			emphasize				
			aspects of the				
			research, was				
			not assisted by				
			ppt media, the				
			answer from the				
			incorrect unable				
			to formulate				
			suggestions for				
			improvement				
1	1	1		1	1	1	

not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for			a e ir a r a n n c a q g ir f f f s ir 9.1 10 p c c w w a a e ir i a n p c c a n n n c c a a n c c a a n c c a a n c c a a n c c a a n c c a a n c c a a c a c	and/or did not emphasize mportant aspects of the esearch, was assisted by ppt nedia but did not neet the media criteria, the answers from the questioner were generally ncorrect, ormulated suggestions for mprovement L. The presentation was carried out, but was not coherent and/or did not emphasize mportant aspects of the esearch, was not assisted by opt media, the answer from the
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14	Able to make decisions based on information and data analysis and provide guidance in choosing alternative solutions.	 Explain the meaning of mechanical energy Determines the amount of mechanical energy for various states of an object Explain the law of conservation of energy Identify 13 forms of energy that occur in everyday life. For example: various forms of energy in earthquakes, roll coasters 	Criteria: 1.Score 2.Rubric 3.4 4.The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement 5.3 6.The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement 7.2 8.The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not emphasize important aspects of the research, was assisted by ppt media but did not met the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10.The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not met the media criteria, the answers from the questioner was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by pt media, the answer from the questioner was	Student- centered learning approach (student- centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50		0%
			not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement			

16	on information and data analysis and provide guidance in choosing alternative solutions.	 mechanical energy 2.Determines the amount of mechanical energy for various states of an object 3.Explain the law of conservation of energy 4.Identify 13 forms of energy that occur in everyday life. For example: various forms of energy in earthquakes, roll coasters 	 2.Rubric 3.4 4. The presentation was carried out coherently with appropriate intonation and emphasis, assisted by ppt media according to media criteria, the answer from the questioner was correct, formulating suggestions for improvement 5.3 6. The presentation was carried out coherently with intonation and but did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement 7.2 8. The presentation was carried out, was not coherent and/or did not emphasize the important aspects of the research, with the help of ppt media according to media criteria, the answers from the questioner were generally correct, formulating suggestions for improvement 7.2 8. The presentation was carried out, was not coherent and/or did not emphasize important aspects of the research, was assisted by ppt media but did not meet the media criteria, the answers from the questioner were generally incorrect, formulated suggestions for improvement 9.1 10. The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research, was not assisted by ppt media, the answer from the questioner was incorrect, formulated suggestions for improvement 9.1 10. The presentation was carried out, but was not coherent and/or did not emphasize important aspects of the research was not assisted by ppt media, the answer from the questioner was incorrect, unable to formulate suggestions for improvement 	learning approach (student- centered learning) Deductive learning method Strategy Lectures, discussions and presentations 3 X 50			0%
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Evaluation Percentage Recap: Case Study No Evaluation Percentage 0%

Notes

- Learning Outcomes of Study Program Graduates (PLO Study Program) are the abilities possessed by each Study
 Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their
 study program obtained through the learning process.
- 2. The PLO imposed on courses are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
- 3. Program Objectives (PO) are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
- 4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
- Indicators for assessing ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
- Assessment Criteria are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
- 7. Forms of assessment: test and non-test.
- 8. Forms of learning: Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
- 9. Learning Methods: Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning,
- Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
 10. Learning materials are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 11. The assessment weight is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
- 12. TM=Face to face, PT=Structured assignments, BM=Independent study.