	Universitas Negeri Surabaya Vocational Faculty, D4 Civil Engineering Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Earthquake Engineering	2230502013	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	3	April 29, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	**Project Based Learning**
Program Learning Outcomes (PLO)	**PLO study program which is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	The course contains an introduction to earthquakes and their causes, the composition of the layers of the earth and the theory of tectonic plates, the influence of earthquake forces on civil engineering buildings, calculations of the center of mass and center of stiffness of buildings, basic earthquake shear forces that act on the foundations of building structures, up to shear forces. Base earthquakes are distributed through levels or diaphragms. application of spectrum response in structural calculations with the help of software based on procedures for earthquake resistance planning for building and non-building structures (SNI 1726:2019).
References	**Main :**
	1. Anonimous, 2012, Tata cara perencanaan ketahanan gempa untuk struktur bangunan gedung dan non gedung (SNI 1726:2012), Jakarta: Badan Standar Nasional 2. Andang Widjaja, 2010, Gempa, Surabaya: Jurusan Teknik Sipil FT UNESA 3. Himawan Indarto, Hanggoro Tri Cahyo, A, Kukuh C. Adi Putra, 2013, Aplikasi SNI Gempa 1726-2012 for Dummies, Semarang,
	Supporters:
Supporting lecturer	Ir. Fransiskus Xaverius Maradona Manteiro, S.T., M.Sc. Anggi Rahmad Zulfikar, M.T. Berkat Cipta Zega, S.Pd., M.Eng.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Understanding earthquakes and their causes. The composition of the earth's crust and its formation	Able to explain the term earthquake, causes of earthquakes, tsunamis, and can mention the composition of the layers of the earth's crust, and the theory of earth plates	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and assignments 2 X 50			0%
2	Understanding earthquakes and their causes. The composition of the earth's crust and its formation	Able to explain the term earthquake, causes of earthquakes, tsunamis, and can mention the composition of the layers of the earth's crust, and the theory of earth plates	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and assignments 2 X 50			0%
3	Understand the effects of earthquakes on civil engineering buildings and the damage they cause. R earthquake energy scale and MMI conversion in buildings	Able to understand earthquake scale measurements and their effects on buildings	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and assignments 2 X 50			0%
4	Understand the effects of earthquakes on civil engineering buildings and the damage they cause. R earthquake energy scale and MMI conversion in buildings	Able to understand earthquake scale measurements and their effects on buildings	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and assignments 2 X 50			0%
5	Understand the effects of earthquakes on civil engineering buildings and the damage they cause. R earthquake energy scale and MMI conversion in buildings	Able to understand earthquake scale measurements and their effects on buildings	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and assignments 2 X 50			0%
6	Understand how earthquake recording and other data by BMKG works	Able to mention earthquake recording / how BMKG works	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and seeing the BMKG 2 X 50 equipment directly			0%
7	Understand how earthquake recording and other data by BMKG works	Able to mention earthquake recording / how BMKG works	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and seeing the BMKG 2 X 50 equipment directly			0%
8	UTS	-	**Criteria:** - **Form of Assessment** : Test	- 2 X 50			20%

9	Understand the calculation of the center of mass and stiffness of buildings	1. Determine the dimensions of column beam plates, calculate building loads, determine center of gravity, calculate static moments 2. Calculate the center of mass for each of the 13 floors of the entire building 3. Calculate the center of stiffness of the columns for each 13th floor of the entire building	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, assignments 2 X 50			0%
10	Understand the calculation of the center of mass and stiffness of buildings	1. Determine the dimensions of column beam plates, calculate building loads, determine center of gravity, calculate static moments 2. Calculate the center of mass for each of the 13 floors of the entire building 3. Calculate the center of stiffness of the columns for each 13th floor of the entire building	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, assignments 2 X 50			0%

11	Understand the calculation of the center of mass and stiffness of buildings	1. Determine the dimensions of column beam plates, calculate building loads, determine center of gravity, calculate static moments 2. Calculate the center of mass for each of the 13 floors of the entire building 3. Calculate the center of stiffness of the columns for each 13th floor of the entire building	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, assignments 2 X 50			0%
12	Understand and calculate or apply factors that influence earthquakes, calculate response spectrum	1. Be able to state the earthquake formula. 2. Describe the earthquake formula and apply it by calculating according to the guidelines	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and assignments 2 X 50			0%
13	Understand and calculate or apply factors that influence earthquakes, calculate response spectrum	1. Be able to state the earthquake formula. 2. Describe the earthquake formula and apply it by calculating according to the guidelines	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and assignments 2 X 50			0%

14	Applying earthquake calculations into building structure calculations with the help of software programs	1. Able to calculate building loads: dead and alive according to SNI 1726-2013 2. Calculate the shear force, divide the shear force into each floor, divide the shear force into each portal, 3. Applying spectrum response into earthquake calculations with software	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and assignments 2 X 50			0%
15	Applying earthquake calculations into building structure calculations with the help of software programs	1. Able to calculate building loads: dead and alive according to SNI 1726-2013 2. Calculate the shear force, divide the shear force into each floor, divide the shear force into each portal, 3. Applying spectrum response into earthquake calculations with software	**Criteria:** Perfect score if answered correctly	Lectures, discussions, questions and answers, and assignments 2 X 50			0%
16			**Form of Assessment** : Test				30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Test	50%
		50%

Notes

1. **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.

5. **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.
6. **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.