

Universitas Negeri Surabaya Faculty of Engineering Civil Engineering Undergraduate Study Program

Document Code

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Courses		CODE			C	Cours	se Fa	mily		Cr	edit	Weig	ht	5	SEMES	STER	Cor Dat	npilati e	on
Earthquake E	ngineering	222010209	6		C F	Comp Progra	ulsor am S	y Sti ubje	udy cts	T=	2 P	'=0 E	CTS=3.	18	4	ł	Aug 202	ust 22 2	,
AUTHORIZAT	ION	SP Develo	per						Course Cluster Coordinator				r s	Study Program Coordinator					
		Drs. Andan Gangsar B Yogie Risd Firmansyal	ig Wid rilian F ianto, 1 Sofia	jaja, S Putra, S.T., Into, S	S.T., S.Tr. M.T. S.T.,	M.T. .T., N ; Moo M.Sc	; Alwa I.T. ; cham ., M.1	an ad	-						Yogie	Risdia	anto, S	.Т., М.	т.
Learning model	Case Studies																		
Program	PLO study program that is charged to the course																		
Outcomes	Program Objectives (PO)																		
(PLO)	YO - 1 Students are able to design earthquake engineering in building structure planning.																		
	PO - 2	Students are able to apply earthquake engineering calculations in building structure planning.																	
	PO - 3	Students are able	e to ca	lculat	e ear	thqua	ake e	ngin	eerin	g in bi	uildin	ıg stru	ictural pl	annir	ng.				
	PLO-PO Matrix																		
		PO-1 PO-2 PO-3																	
	PO Matrix at the end of each learning stage (Sub-PO)																		
											14/0	al.							I
		P.0					-	<u> </u>	-		vve	ек	14	10	10		45	10	
		PO 1	1	2	3	4	5	ь	1	8	9	10	11	12	13	14	15	10	
		PO-1											+						
		PO-3																	
Short Course Description	Introduction to ear of earthquake ford forces acting on (software).) base 1726:2012 and/or	rthquakes and the ces on civil engine building structur ed on 1C Proced SNI 1726:2019)	eir cau eering es, ap dures	ses, t buildi oplica for e	the co ings, tion arthq	ompo calcu of re uake	sition lating spons resis	of the the se s stand	ne ea cent pectr ce pla	rth's l er of r um ir anning	ayers nass n stri g for	s and and uctura 1D I	the theo center of al calcula ouilding	ry of stiffr ation: and	tecton ness of s with non-bu	ic plate f buildi the h uilding	es, the ngs, e ielp of struct	influe arthqu softw ures (nce ake /are SNI
References	Main :																		
	 Anonimol 1726:201 Andang V Himawan 	us. 2012. Tatacaı 2). Jakarta: Bada Vidjaja. 2010. Gel Indarto, Hanggol	ra per n Stan mpa. S ro Tri (encai Idar N Surab Cahyo	naan Nasior Daya: . D A, K	ketal nal Jurus (ukuh	nanai an Te I C Ae	n ge eknil di Pu	mpa c Sipi itra. 2	untuk I FT U 2013. J	: stru INES Aplik	ıktur SA xasi SI	banguna NI Gemp	n ge 0a 17	dung (26 for	dan no Dumm	on geo iies. Se	lung (S emarai	SNI ng.
	Supporters:																		

Week-	Final abilities of each learning	Eva	aluation	He Lear Stude	elp Learning, ning methods, nt Assignments, stimated time]	Learning materials [References]	Assessment Weight (%)
	(Sub-PO)	Indicator	Criteria & Form	Offline (offline)	Online (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	(2) Understanding earthquakes and their causes. The composition of the earth's crust and its formation	(3) Able to explain the term earthquake, causes of earthquakes, tsunamis, and can mention the layers of the earth's crust, and the theory of earth plates	(4) Form of Assessment : Participatory Activities	(5) Lectures, discussions, questions and 2 X 50 assignments	(6) Lectures, discussions, questions and answers, and assignments	(7) Material: earthquakes and their causes and the composition of the earth's crust and its formation. Reference: Anonymous. 2012. Procedures for earthquake resistance planning for building and non-building structures (SNI 1726:2012). Jakarta: National Standards Agency Material: earthquakes and their causes and the composition of the earth's crust and its formation. Reader: Andang Widjaja. 2010. Earthquake. Surabaya: Civil Engineering Department, FT UNESA Material: earthquakes and their causes and the composition of the earth's crust and its formation. Reader: Andang Widjaja. 2010. Earthquake. Surabaya: Civil Engineering Department, FT UNESA	(8)

3	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: Follow lectures carefully, take notes, ask questions and discuss during lectures	Lectures, discussions, questions and answers, and 2 X 50 assignments	Lectures, discussions, questions and answers, and 2 X 50 assignments	Material: The theory of the formation of the earth, the arrangement of the earth's plates/crust, volcanoes, and the island of Pangea. Library: Anonymous. 2012. Procedures for earthquake resistance planning for building and non-building structures (SNI 1726:2012). Jakarta: National Standards Agency Material: The theory of the formation of the earth, the arrangement of the plates/crust of the earth, the arrangement of the earth's formation, the arrangement of the earth's plates/crust, volcanoes, and Pangea Island. Readers: Himawan Indarto, Hanggoro Tri Cahyo A, Kukuh C Adi Pura. 2013. Application of SNI for the 1726 Earthquake	2%
						1726 Earthquake for Dummies. Semarang.	

4	Understand the effects of	Able to	Form of	Lectures,	Lectures, discussions,	Material: the	7%
	earthquakes on	earthquake	Assessment :	questions	answers, and	earthquakes	
	buildings and the	measurements	Participatory	and	assignments	on civil	
	damage they cause, earthquake	and their effects on	Activities	and		buildings and	
	energy scale R	buildings		2 X 50		the damage	
	conversion in			assignments		they cause,	
	buildings					earthquake	
						energy scale	
						conversion in	
						buildings.	
						Reference:	
						2012.	
						Procedures	
						ior earthquake	
						resistance	
						planning for	
						non-building	
						structures	
						(SNI 1726·2012)	
						Jakarta:	
						National	
						Agency	
						Material: the	
						earthquakes	
						on civil	
						engineering	
						the damage	
						they cause,	
						earthquake	
						energy scale	
						R and MMI	
						buildings.	
						Library:	
						Andang Widiaia, 2010,	
						Earthquake.	
						Surabaya:	
						Engineering	
						Department,	
						FIUNESA	
						Material: the	
						effect of	
						on civil	
						engineering	
						buildings and	
						they cause,	
						the	
						earnquake energy scale	
						R and MMI	
						conversion in buildings	
						References:	
						Himawan	
						indarto, Handdoro Tri	
						Cahyo A,	
						Kukuh C Adi	
						Application of	
						SNI for the	
						1726 Farthquako	
						for Dummies.	
						Semarang.	

5	Understand the effects of earthquakes on	Able to understand	Criteria: Full marks, if the	Lectures, discussions,	Lectures, discussions, questions and	Material: the effect of	3%
	civil engineering buildings and the damage they	scale measurements and their	accompanied by pictures and clear and correct	questions and answers,	2 X 50 assignments	eartnquakes on civil engineering	
	cause. earthquake energy scale R	effects on buildings	narration.	and 2 X 50		buildings and the damage	
	and MMI conversion in		Form of Assessment	assignments		they cause. R earthquake	
	buildings		Participatory			energy scale and MMI	
						conversion in buildings	
						Reference: Anonymous.	
						2012. Procedures	
						for earthquake	
						resistance planning for	
						building and non-building	
						structures (SNI	
						1726:2012). Jakarta:	
						National Standards	
						Agency	
						Material: the effect of	
						earthquakes on civil	
						engineering buildings and	
						the damage they cause. R	
						earthquake energy scale	
						and MMI conversion in	
						buildings Library:	
						Andang Widjaja. 2010.	
						Earthquake. Surabaya:	
						Civil Engineering	
						FT UNESA	
						Material: the	
						earthquakes	
						engineering	
						the damage	
						earthquake energy scale	
						and MMI conversion in	
						buildings Librarv:	
						Himawan Indarto.	
						Hanggoro Tri Cahyo A,	
						Kukuh C Adi Putra. 2013.	
						Application of SNI for the	
						1726 Earthquake	
						for Dummies. Semarang.	

	·		1	1		r	r
9	Understand the calculation of the center of mass and stiffness of buildings	Determining the dimensions of column beam plates, calculating building loads, determining center of gravity, calculating the calculating the calculating the center of mass of each floor of the entire building Calculating the center of stiffness of columns for each floor of the entire building	Form of Assessment : Participatory Activities	Lectures, discussions, questions and answers, assignments 2 X 50	Lectures, discussions, questions and answers, assignments	Material: calculation of center of mass and stiffness of buildings. Reference: Anonymous. 2012. Procedures for earthquake resistance planning for building and non-building structures (SNI 1726:2012). Jakarta: National Standards Agency Material: calculation of center of mass and stiffness of buildings Reader: Andang Widjaja. 2010. Earthquake. Surabaya: Civil Engineering Department, FT UNESA Material: calculation of center of mass and stiffness of buildings Reader: Andang Widjaja. 2010. Earthquake. Surabaya: Civil Engineering Department, FT UNESA Material: calculation of center of mass and stiffness of buildings References: Himawan Indarto, Hanggoro Tri Cahyo A, Kukuh C Adi Putra. 2013. Application of SNI for tho	2%
						Kukuh C Adi Putra. 2013. Application of SNI for the 1726 Earthquake for Dummies. Semarang.	

10	Linderstand the	Determining		Lasturas	Lasturas, dissussions	Motorial	704
10	calculation of the	the	Form of	discussions.	questions and	calculation of	790
	center of mass and	dimensions of	Assessment :	questions	answers, assignments	center of	
	stiffness of	column beam	Participatory	and	, 3	mass and	
	bullulitys	calculating	Activities	answers,		stiffness of	
		building loads,		assignments		buildings.	
		determining		2 X 50		Reference:	
		center of				Anonymous.	
		calculating				2012. Duga salawa s	
		static				for	
		moments				iui earthquake	
		center of mass				resistance	
		of each floor of				planning for	
		the entire				building and	
		Duilding Calculating the				non-building	
		center of				structures	
		stiffness of				(SNI 1700-2012)	
		columns for				1726:2012). Jokarta:	
		the entire				National	
		building				Standards	
						Agency	
						Material:	
						calculation of	
						center of	
						mass and	
						huildings	
						Reader:	
						Andang	
						Widjaja. 2010.	
						Earthquake.	
						Surabaya:	
						CIVII	
						Engineering	
						ET UNESA	
						Material:	
						calculation of	
						center of	
						mass and	
						sumess of	
						Peferences	
						Himawan	
						Indarto.	
						, Hanggoro Tri	
						Cahyo A,	
						Kukuh C Adi	
						Putra. 2013.	
						Application of	
						31VI 101 1110 1726	
						Earthquake	
						for Dummies.	
						Semarang.	

12	Understand and	Able to state		Lectures,	Lectures, discussions,	Material:	7%
12	Understand and calculate or apply factors that influence earthquakes, calculate spectrum responses	Able to state the earthquake formula. Describe the earthquake formula and apply it by calculating according to the guidelines	Form of Assessment : Participatory Activities	Lectures, discussions, questions and answers, and 2 X 50 assignments	Lectures, discussions, questions and answers, and assignments	Material: factors that influence earthquakes, calculating spectrum responses. Reference: Anonymous. 2012. Procedures for earthquake resistance planning for building and non-building structures (SNI 1726:2012). Jakarta: National Standards Agency Material: factors influencing earthquakes, calculating the spectrum response Reader: Andang Widjaja. 2010. Earthquake. Surabaya: Civil Engineering Department, FT UNESA Material: factors influencing earthquakes, calculating the spectrum response	7%
						FT UNESA Material: factors influencing earthquakes, calculating the spectrum response References: Himawan Indarto, Hanggoro Tri Cahyo A, Kukuh C Adi Putra. 2013. Application of SNI for the 1726 Earthquake for Dummies. Semarang.	

10	Lindorstand and	Po oble to	Criteria	Lootuw		Matarial	20/
13	Understand and calculate or apply factors that influence earthquakes, calculate spectrum responses	Be able to state the earthquake formula. Describe the earthquake formula and apply it by calculating according to the guidelines	Criteria: Full marks, if the answer is accompanied by pictures and clear and correct narration	Lectures, discussions, questions and 2 X 50 assignments	Lectures, discussions, questions and answers, and 2 X 50 assignments	Material: factors that influence earthquakes, calculating spectrum responses. Reference: Anonymous. 2012. Procedures for earthquake resistance planning for building and non-building structures (SNI 1726:2012). Jakarta: National Standards Agency Material: factors influencing earthquakes, calculating the spectrum response Reader: Andang Widjaja. 2010. Earthquake. Surabaya: Civil Engineering Department, FT UNESA	2%
						National Standards Agency Material: factors influencing earthquakes, calculating the spectrum response Reader: Andang Widjaja. 2010. Earthquake. Surabaya: Civil Engineering Department, FT UNESA Material: factors influencing earthquakes, calculating the spectrum response References: Himawan	
						Indarta, Indarta, Hanggoro Tri Cahyo A, Kukuh C Adi Putra. 2013. Application of SNI for the 1726 Earthquake for Dummies. Semarang.	

	A search size as						201
14	earthquake	calculate	Form of	Lectures,	Lectures, discussions,	waterial:	2%
	calculations into	building loads:	Assessment :	questions	answers, and	calculations in	
	building structure	dead and alive	Participatory	and	2 X 50 assignments	building	
	the help of	SNI 1726-	Activities	answers,	J. J	structure	
	software programs	2013		and		calculations	
		Calculating		2 X 50		with the help	
		snear force, dividing shear		assignments		of software	
		force to each				Aponymous	
		floor, dividing				2012.	
		snear force to				Procedures	
		Applying				for	
		spectrum				earthquake	
		response into				resistance	
		calculations				planning for	
		with software				pon-huilding	
						structures	
						(SNI	
						1726:2012).	
						Jakarta:	
						National	
						Standards	
						Agency	
						Material:	
						earthquake	
						calculations in	
						building	
						structure	
						with the help	
						of the	
						Pustaka	
						software	
						program:	
						Andang Widipip 2010	
						Farthquake	
						Surabaya:	
						Civil	
						Engineering	
						Department,	
						FIUNESA	
						Material:	
						earthquake	
						calculations in	
						building	
						calculations	
						with the help	
						of soft	
						programs.	
						Reader:	
						HIMAWAN	
						Hanggoro Tri	
						Cahyo A.	
						Kukuh C Adi	
						Putra. 2013.	
						Application of	
						SNI for the	
						1/20 Farthquaka	
						for Dummies	
						Semarang.	

15	Applying earthquake calculations into building structure calculations with the help of software programs	Able to calculate building loads: dead and alive according to SNI 1726- 2013 Calculating shear force to each portal, Applying spectrum response into earthquake calculations with software	Criteria: Full marks, if the answer is accompanied by pictures and clear and correct narration	Final Exam	Eectures, discussions, questions and answers, and 2 X 50 assignments	Naterial: earthquake calculations in building structure calculations with the help of software library: Anonymous. 2012. Procedures for earthquake resistance planning for building and non-building structures (SNI 1726:2012). Jakarta: National Standards Agency Material: earthquake calculations in building structure calculations with the help of the Pustaka software program: Andang Widjaja. 2010. Earthquake. Surabaya: Civil Engineering Department, FT UNESA Material: earthquake calculations in building structure calculations with the help of soft programs. Reader: Himawan Indarto, Hanggoro Tri Cahyo A, Kukuh C Adi Putra. 2013. Application of SNI for the 1726 Earthquake for Dummies. Semarang.	8%
		questions correctly and precisely	Full marks are obtained if you do all the questions correctly and correctly Form of Assessment : Test	Semester 2 x 50	2 x 50		

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	50%
2.	Test	50%
		100%

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.
- 5. **Indicators for assessing** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.
- 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.