	Universitas Negeri Surabaya Faculty of Engineering Civil Engineering Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Concrete Structures	2220104113	Compulsory Study Program Subjects	T=4	P=0	ECTS=6.36	3	July 17, 2024

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)	
	PO - 1	Students have the ability to plan in concrete structures courses by utilizing learning resources and ICT
	PO - 2	Students have knowledge of the theory of concrete structures from plate calculations to foundations
	PO - 3	Students have the ability to design and choose the appropriate concrete structure calculation method according to the student's characteristics
	PO - 4	Students have a responsible attitude in developing concrete structure courses in accordance with applicable regulations
	PLO-PO Matrix	

P.O
PO-1
PO-2
PO-3
PO-4

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
PO-1																
PO-2																
PO-3																
PO-4																

Short Course Description	Basic assumptions for calculating reinforced concrete, load and load factors, analysis and methods for designing rectangular sections in terms of ultimate strength. Calculation of cantilever plates, one-way plates, two-way plates, plates with line loads and deflection control and crack width control. Calculation of double-supported beams, calculation of stairs, T-beams, double-bone beams and deflection control, and distribution lengths, shear and torsion calculations. Calculation of short consoles, basics of calculating column strength, braced and unbraced frames, safety provisions, short columns with small and large eccentricities, slender columns, percentage of reinforcement, round columns, beam and column connections, palm foundations, continuous slab foundations, full slab foundations and deep foundation.
References	**Main :**

1. Departemen PU. 2013. Persyaratan Beton Struktural untuk Bangunan Gedung SNI 2847. BSN Bandung LPMB.
2. Gideon Kusuma.1993. Dasar-dasar Perencanaan Beton Bertulang berdasarkan SKSNI. Jakarta: Erlangga.
3. Edward G Nawy. 2009. Reinforced Concrete A Fundamental Approach. New York: Prentice Hall.
4. Jack C. Mc. Cormac. 2013. Design of Reinforced Concrete. Russel H Brown.
5. ACI Journal. 2015. ACI Structural Journal American Concrete Institute.

Supporters:	
Supporting lecturer	Arie Wardhono, S.T., M.MT., M.T., Ph.D. Yogie Risdianto, S.T., M.T.

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	Able to explain how to derive formulas for rectangular design of reinforcement	Explain the basic assumptions for calculating rectangular cross-sections	**Criteria:** Can plan plate thickness correctly (score 50). Can draw correctly (score 50) **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Rectangular reinforcement design. **Reference:** *Gideon Kusuma. 1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.*	4%
2	Students are able to plan reinforcement for cantilever plates and one-way plates	Explains limit strength planning and can calculate reinforcement for cantilever plates and one-way plates	**Criteria:** 1.Can plan plate thickness correctly (score 50). 2.Can draw correctly (score 50) **Form of Assessment** : Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Cantilever plate reinforcement and one-way plate **Reference:** *Edward G Nawy. 2009. Reinforced Concrete A Fundamental Approach. New York: Prentice Hall.*	4%
3	Students are able to plan two-way plate reinforcement and line load plates	Explains how to calculate two-way plates and line load plates	**Criteria:** 1.Can plan plate thickness correctly (score 50). 2.Can draw correctly (score 50) **Form of Assessment** : Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Two-way plate reinforcement and line load plate **Reference:** *Edward G Nawy. 2009. Reinforced Concrete A Fundamental Approach. New York: Prentice Hall.*	4%
4	Students are able to apply deflection control and crack width control	Explains how to apply deflection and crack width controls	**Criteria:** 1.Can plan plate thickness correctly (score 50). 2.Can draw correctly (score 50) **Form of Assessment** : Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Deflection control and crack width control **Reference:** *Jack C. Mc. Cormac. 2013. Design of Reinforced Concrete. Russell H Brown.*	4%

5	1. Students are able to calculate the reinforcement of single reinforced beams and their shear reinforcement 2. Students are able to calculate the reinforcement of T beams	1. Explains how to calculate a two-support beam and its shear reinforcement 2. Explain how to calculate T beam reinforcement	**Criteria:** 1. Can plan single reinforced beams and T beams correctly (score 50). 2. Can draw correctly (score 50) **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Reinforcement of single reinforced beams and their shear reinforcement. **Reference:** *Edward G Nawy. 2009. Reinforced Concrete A Fundamental Approach. New York: Prentice Hall.* **Material:** T-beam reinforcement **Reference:** *Department of Public Works. 2013. Structural Concrete Requirements for Buildings SNI 2847. BSN Bandung LPMB.*	4%
6	1. Students are able to calculate the reinforcement of single reinforced beams and their shear reinforcement 2. Students are able to calculate the reinforcement of T beams	1. Explains how to calculate a two-support beam and its shear reinforcement 2. Explain how to calculate T beam reinforcement	**Criteria:** 1. Can plan single reinforced beams and T beams correctly (score 50). 2. Can draw correctly (score 50) **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Two-support beam and shear reinforcement **Reference:** *Edward G Nawy. 2009. Reinforced Concrete A Fundamental Approach. New York: Prentice Hall.* **Material:** T-beam reinforcement **Reference:** *Department of Public Works. 2013. Structural Concrete Requirements for Buildings SNI 2847. BSN Bandung LPMB.*	3%
7	Students are able to calculate the reinforcement of double reinforcing beams	Explain how to calculate the reinforcement of double reinforcing beams	**Criteria:** Can plan double reinforcement beams correctly **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Reinforcement of double reinforcing beams **Reference:** *Gideon Kusuma.1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.*	3%
8	Midterm Exam (UTS)		**Form of Assessment** : Project Results Assessment / Product Assessment, Test				20%

9	1. Students are able to plan torsional shear beams 2. Students are able to plan short consoles	1. Explain the ultimate strength planning for torsion shear beams 2. Explains short console planning	**Criteria:** 1. Can plan reinforcement for torsion shear beams and short consoles correctly (score 50). 2. Can draw correctly (score 50) **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Twisted shear beam **Reference:** *Jack C. Mc. Cormac. 2013. Design of Reinforced Concrete. Russell H Brown.* **Material:** Short console **Reader:** *Gideon Kusuma.1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.*	3%
10	1. Students are able to plan torsional shear beams 2. Students are able to plan short consoles	1. Explain the ultimate strength planning for torsion shear beams 2. Explains short console planning	**Criteria:** 1. Can plan reinforcement for torsion shear beams and short consoles correctly (score 50). 2. Can draw correctly (score 50) **Form of Assessment** : Participatory Activities	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Limit strength of torsion shear beams **Reference:** *Edward G Nawy. 2009. Reinforced Concrete A Fundamental Approach. New York: Prentice Hall.* **Material:** Short console planning **Reader:** *Jack C. Mc. Cormac. 2013. Design of Reinforced Concrete. Russell H Brown.*	3%
11	1. Students are able to plan ordinary columns and columns using stiffeners 2. Students are able to plan short columns with small and large eccentricities	1. Explains the planning of ordinary columns and columns using stiffeners 2. Explains the planning of short columns with small and large eccentricities	**Criteria:** Can plan columns correctly (score 100). **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Ordinary columns and columns using stiffeners. **Reference:** *Gideon Kusuma. 1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.* **Material:** Short columns with small and large eccentricities **Reader:** *Edward G Nawy. 2009. Reinforced Concrete A Fundamental Approach. New York: Prentice Hall.*	3%

12	1. Students are able to plan ordinary columns and columns using stiffeners 2. Students are able to plan short columns with small and large eccentricities	1. Explains the planning of ordinary columns and columns using stiffeners 2. Explains the planning of short columns with small and large eccentricities	**Criteria:** Can plan columns correctly (score 100). **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Ordinary columns and columns using stiffeners. **Reference:** *Gideon Kusuma. 1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.* **Material:** Short columns with small and large eccentricities **Reader:** *Jack C. Mc. Cormac. 2013. Design of Reinforced Concrete. Russell H Brown.*	3%
13	1. Students are able to plan slim columns 2. Students are able to plan round columns	1. Explain the planning of slender columns 2. Explain the planning of round columns	**Criteria:** Can plan columns correctly (score 100). **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Slim column **Reader:** *Gideon Kusuma.1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.* **Material:** Round column **Reader:** *Gideon Kusuma.1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.*	4%
14	1. Students are able to plan slim columns 2. Students are able to plan round columns	1. Explain the planning of slender columns 2. Explain the planning of round columns	**Criteria:** Can plan columns correctly (score 100). **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Slim column **Reader:** *Gideon Kusuma.1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.* **Material:** Round column **Reader:** *Gideon Kusuma.1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.*	4%

15	1. Students are able to plan beam-column relationships 2. Students are able to plan local, continuous, full slab and foundation calculations	1. Explain the planning of beam-column connections 2. Explains calculations for local, continuous, full plate and deep foundations	**Criteria:** 1. Planning results report (score 60) 2. Report presentation (score 40) **Form of Assessment** : Practice / Performance	Lectures, discussions and questions and answers, 4 X 50 exercises		**Material:** Beam-column relationships **Reference:** *Gideon Kusuma.1993. Basics of Reinforced Concrete Design based on SKSNI. Jakarta: Erlangga.* **Material:** Calculation of local, continuous, full slab and foundations **Reference:** *Department of Public Works. 2013. Structural Concrete Requirements for Buildings SNI 2847. BSN Bandung LPMB.*	4%
16	Final exams		**Form of Assessment** : Project Results Assessment / Product Assessment, Test				30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	18.5%
2.	Project Results Assessment / Product Assessment	52.5%
3.	Practice / Performance	4%
4.	Test	25%
		100%

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** 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.
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.