	Universitas Negeri Surabaya Faculty of Engineering, Building Engineering Education Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Wood Construction*	8320502280	Structure	T=2	P=0	ECTS=3.18	5	August 3, 2022

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 that is charged to the course

Program Objectives (PO)

PO - 1	Students are able to explain and design building structures based on wood materials and the connections in wooden structures
PO - 2	Students are able to describe and explain in the form of reports and drawings the structure of buildings and connections with wooden materials
PO - 3	Students are able to evaluate designs and drawings on building structures made from wood and their connections

PLO-PO Matrix

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

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																

Short Course Description: This course examines the science of wood materials, getting to know the properties of wood, including the structure of wood as an organic material, physical properties of wood, hygroscopic properties of wood, and mechanical properties of wood (direction of fibers and direction of force, elastic modulus, tensile stress, compressive stress , bending stress, shear, moisture content, condition, method and duration of loading). Types and classification of wood (durability, strength and use) commonly used as structural and non-structural materials as well as industry standards for curing and drying, allowable stress. Wood joining tools and wood connections (bolt nails, pegs, adhesives, modern connecting tools and tooth connections), laying construction, beam and pole connections. Structural elements in planning include tension members, compression members (columns with compressive/bending loads), flexible beams, beams supporting moments and normal forces. The appropriate learning model for this course is the direct and cooperative learning method.

References

Main :

1. Wiryomartono, Suwarno. 1968. Konstruksi Kayu. Yogyakarta: UGM.
2. Yap, Felix, K.H. 1984. Konstruksi Kayu. Bandung: Bina Cipta.
3. Frick Heinz. 1986. Ilmu Konstruksi Bangunan Kayu. Yogyakarta: Kanisius.
4. Sadji. 1999. Konstruksi Kayu. Surabaya: ITS Press.
5. Anonim. 1961. Peraturan Konstruksi Kayu Indonesia. Jakarta: DPU
6. Anonim. 2002. Tata Cara Perencanaan Konstruksi Kayu Indonesia (PKKI NI-5).Jakarta: DPU.
7. Awaluddin, Ali. 2005. Konstruksi Kayu. Yogyakarta: UGM.
8. Kusnan. 2011. Konstruksi Kayu. Surabaya: Unipres Unesa.

Supporters:

1. SNI 7973:2013 Spesifikasi Desain untuk Konstruksi Kayu

Supporting lecturer: Drs. Andang Widjaja, S.T., M.T.
Mochamad Firmansyah Sofianto, S.T., M.Sc., 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	Students understand and recognize the structure of wood and the background of wood being used for building construction	Briefly explain the parts of wood and their functions	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly	Presentation/lecture Discussion and reflection 2 X 50	Presentation/lecture Discussion and reflection 2 X 50	**Material:** Introduction and understanding of wood **Library:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Introduction and understanding of wood **Reference:** *Yap, Felix, KH 1984. Wooden Construction. Bandung: Bina Cipta.* **Material:** Introduction and understanding of wood **Reference:** *Awaluddin, Ali. 2005. Wood Construction. Yogyakarta: UGM.*	1%
2	1. Students understand and recognize the structure of wood and the background of wood being used for building construction 2. Students understand measuring the strength of wood materials for various structural components	1. Briefly explain the parts of wood and their functions 2. Briefly explain the testing process for each structural element for wood materials	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Test	Presentation/lecture Discussion and reflection 2 x 50‘	Presentation/lecture Discussion and reflection 2 x 50‘	**Material:** Introduction and understanding of wood **Library:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Introduction and understanding of wood **Reference:** *Yap, Felix, KH 1984. Wooden Construction. Bandung: Bina Cipta.* **Material:** Introduction and understanding of wood **Reference:** *Awaluddin, Ali. 2005. Wood Construction. Yogyakarta: UGM.* **Material:** Introduction and understanding of wood **Reference:** *SNI 7973:2013 Design Specifications for Wooden Construction*	7%

3	Students understand the properties of wood, the physical, chemical, biological and mechanical properties as well as the allowable stress in wood.	1. Explain the physical properties of wood. 2. Explain the chemical and biological properties of wood. 3. Explain the mechanical properties of wood. 4. Explain the allowable stress in wood of its type and class.	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Participatory Activities	- Presentation/lecture - Discussion and reflection 2 X 50	- Presentation/lecture - Discussion and reflection 2 X 50	**Material:** Wood properties and stress in wood based on class. **Reader:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Wood properties and stress in wood based on class. **Reference:** *Frick Heinz. 1986. Science of Wooden Building Construction. Yogyakarta: Kanisius.* **Material:** Wood properties and stress in wood based on class. **Reference:** *Awaluddin, Ali. 2005. Wood Construction. Yogyakarta: UGM.* **Material:** Wood properties and stress in wood based on class. **References:** *SNI 7973:2013 Design Specifications for Wood Construction*	3%

4	Students classify the strength class and durability class of wood to determine the allowable stress of wood for certain construction conditions.	1. Determine the wood strength class and wood durability class based on the name of the race, specific gravity modulus of elasticity. 2. Calculate the allowable stress of wood for construction conditions and working loads.	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	**Material:** Calculation of allowable stress based on construction condition factors and working loads. **Reader:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Calculation of allowable stress based on construction condition factors and working loads. **References:** *Yap, Felix, KH 1984. Wood Construction. Bandung: Bina Cipta.* **Material:** Calculation of allowable stress based on construction condition factors and working loads. **Reference:** *Awaluddin, Ali. 2005. Wood Construction. Yogyakarta: UGM.* **Material:** Calculation of allowable stress based on construction condition factors and working loads. **Reference:** *SNI 7973:2013 Design Specifications for Wood Construction*	7%

5	Students are able to design wooden construction for tension members, compression members and flexible girders.	- Determine and control the dimensions of wood for tension and compression members based on the allowable tensile/compressive stress of the wood. - Determine and control wood dimensions for bending rods based on the allowable bending stress of the wood.	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Participatory Activities	Presentation/lectureDiscussion and reflectionCase study 2 X 50	Presentation/lectureDiscussion and reflectionCase study 2 X 50	**Material:** Dimensional planning of wooden beams for compression and flexural construction. **Reader:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Dimensional planning of wooden beams for compression and flexural construction. **References:** *Yap, Felix, KH 1984. Wood Construction. Bandung: Bina Cipta.* **Material:** Dimensional planning of wooden beams for compression and flexural construction. **Reference:** *Awaluddin, Ali. 2005. Wood Construction. Yogyakarta: UGM.* **Material:** Dimensional planning of wooden beams for compression and flexural construction. **References:** *SNI 7973:2013 Design Specifications for Wood Construction* **Material:** Dimensional planning of wooden beams for compression and flexural construction. **Reference:** *Frick Heinz. 1986. Science of Wooden Building Construction. Yogyakarta: Kanisius.*	4%

6	Students are able to design wooden construction for flexible rods using tension or compression and are able to design wooden construction for double rods.	1. Determine the dimensions of the rod for rods that bend under compression or tension. 2. Determine the cross-sectional dimensions of the double bar.	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Participatory Activities	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	**Material:** Planning the dimensions of wooden beams / columns that experience tensile or axial bending. Double bar planning in wood construction. **Reader:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Planning the dimensions of wooden beams / columns that experience tensile or axial bending. Double bar planning in wood construction. **Reference:** *Frick Heinz. 1986. Science of Wooden Building Construction. Yogyakarta: Kanisius.* **Material:** Planning the dimensions of wooden beams / columns that experience tensile or axial bending. Double bar planning in wooden construction.\ **Reference:** *Awaluddin, Ali. 2005. Wood Construction. Yogyakarta: UGM.* **Material:** Planning the dimensions of wooden beams / columns that experience tensile or axial bending. Double bar planning in wood construction. **Reference:** *SNI 7973:2013 Design Specifications for Wood Construction*	2%

7	Students are able to design wooden construction for flexible rods using tension or compression and are able to design wooden construction for double rods.	1. Determine the dimensions of the rod for rods that bend under compression or tension. 2. Determine the cross-sectional dimensions of the double bar.	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Test	- Presentation/lecture - Discussion and reflection - 2 x 50 case studies	- Presentation/lecture - Discussion and reflection - 2 x 50 case studies	**Material:** Planning the dimensions of wooden beams / columns that experience tensile or axial bending. Double bar planning in wood construction. **Reader:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Planning the dimensions of wooden beams / columns that experience tensile or axial bending. Double bar planning in wood construction. **Reference:** *Frick Heinz. 1986. Science of Wooden Building Construction. Yogyakarta: Kanisius.* **Material:** Planning the dimensions of wooden beams / columns that experience tensile or axial bending. Double bar planning in wood construction. **Reference:** *Awaluddin, Ali. 2005. Wood Construction. Yogyakarta: UGM.* **Material:** Planning the dimensions of wooden beams / columns that experience tensile or axial bending. Double bar planning in wood construction. **Reference:** *SNI 7973:2013 Design Specifications for Wood Construction*	8%
8	UTS	UTS	**Criteria:** UTS **Form of Assessment** : Test	UTS 2 X 50			20%

9	Students are able to design and calculate bolted connections based on maximum tensile or compressive forces.	1. Calculate the nominal force capacity of each bolt. 2. Determine the number of bolts. 3. Determine the distance between bolts.	**Criteria:** Listen carefully, take notes and ask questions **Form of Assessment** : Participatory Activities	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	**Material:** Connection Planning **Bibliography:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Planning **Bibliography Connection:** *Yap, Felix, KH 1984. Wood Construction. Bandung: Bina Cipta.* **Material:** Connection Planning **Bibliography:** *Frick Heinz. 1986. Science of Wooden Building Construction. Yogyakarta: Kanisius.* **Material:** Planning **Library Connection:** *SNI 7973:2013 Design Specifications for Wooden Construction*	1%
10		Calculate the nominal strength of bolt and clamp connections	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Test	- Presentation/lecture - Discussion and reflection - 2 x 50 case studies	- Presentation/lecture - Discussion and reflection - 2 x 50 case studies	**Material:** Calculation of bolt connections in wooden construction. **Reader:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Calculation of bolt connections in wooden construction. **Reference:** *SNI 7973:2013 Design Specifications for Wood Construction* **Material:** Calculation of bolt connections in wooden construction. **References:** *Yap, Felix, KH 1984. Wood Construction. Bandung: Bina Cipta.* **Material:** Calculation of bolt connections in wooden construction. **Reference:** *Frick Heinz. 1986. Science of Wooden Building Construction. Yogyakarta: Kanisius.*	7%

11	Students are able to calculate the tooth and heel joints in wooden construction and how to install them.	1. Calculate the nominal force and stress of installing a single tooth connection. 2. Calculate nominal forces and stresses from installing frame and/or heel gear connections. 3. Determines the installation of single and double tooth connections in wood construction connections.	**Criteria:** 1. Full marks are obtained if you do all the questions correctly and correctly 2. Listen carefully, take notes and ask questions **Form of Assessment** : Participatory Activities	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	**Material:** Calculation of tooth and heel joints in wooden construction. **Reference:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Calculation of tooth and heel joints in wooden construction. **Reference:** *Awaluddin, Ali. 2005. Wood Construction. Yogyakarta: UGM.* **Material:** Calculation of tooth and heel joints in wooden construction. **Reference:** *Yap, Felix, KH 1984. Wooden construction. Bandung: Bina Cipta.* **Material:** Calculation of tooth and heel joints in wooden construction **Reference:** *SNI 7973:2013 Design Specifications for Wooden Construction*	1%
12	Students are able to calculate nail connections in wooden construction and how to install them.	1. Determining the size of the nail. 2. Calculate the nominal force of each nail connection installation. 3. Determine the installation distance from the nail joint.	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Test	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	**Material:** Calculation of nail connections in wooden construction. **Reader:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Calculation of nail connections in wooden construction. **References:** *SNI 7973:2013 Design Specifications for Wood Construction* **Material:** Calculation of nail connections in wooden construction. **References:** *Yap, Felix, KH 1984. Wood Construction. Bandung: Bina Cipta.*	7%

13	Students are able to calculate the joints of building blocks with nails and dowel connections for wooden construction.	1. Determine the nominal force of each nail. 2. Determine the installation of nails on building blocks. 3. Controlling the capacity of stacking beam connections with nails. 4. Determine the size of the wood for the dowel connection. 5. Calculate nominal forces in wood joints. 6. Determine the installation of pegs.	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Participatory Activities	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	- Presentation/lecture - Discussion and reflection - 2 X 50 case studies	**Material:** Calculation of stacking beam connections with nails and dowel connections in wooden construction. **Reader:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Calculation of stacking beam connections with nails and dowel connections in wooden construction. **Reference:** *Awaluddin, Ali. 2005. Wood Construction. Yogyakarta: UGM.* **Material:** Calculation of stacking beam connections with nails and dowel connections in wooden construction. **References:** *Yap, Felix, KH 1984. Wood Construction. Bandung: Bina Cipta.* **Material:** Calculation of stacking beam connections with nails and dowel connections in wooden construction. **Reader:** *Anonymous. 2002. Procedures for Planning Indonesian Wood Construction (PKKI NI-5). Jakarta: DPU.* **Material:** Calculation of stacking beam connections with nails and dowel connections in wooden construction. **References:** *SNI 7973:2013 Design Specifications for Wood Construction*	2%

14	Students are able to understand and calculate connections in simple girders.	1. Determine the connection and calculate the nominal force of the connection. 2. Determine and calculate the dimensions of wooden connecting plates. 3. Calculating controls for girder connections.	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Participatory Activities	Presentation of material and group discussion. Case study 2 X 50	Presentation of material and group discussion. Case study 2 X 50	**Material:** Connections on simple girders. **Reader:** *Kusnan. 2011. Wood Construction. Surabaya: Unipres Unesa.* **Material:** Connections on simple girders. **References:** *Yap, Felix, KH 1984. Wood Construction. Bandung: Bina Cipta.* **Material:** Connections on simple girders. **References:** *SNI 7973:2013 Design Specifications for Wood Construction*	2%
15	Students are able to complete and present group assignments related to planning in wooden construction.	1. Determine the type of construction being discussed. 2. Calculating load planning. 3. Calculate internal forces and moments. 4. Determine the type of connection used. 5. Plan and draw how to install connections.	**Criteria:** Full marks are obtained if you do all the questions correctly and correctly **Form of Assessment** : Practice / Performance	- Group discussion of case studies. - Class presentations by students. 2 X 50	- Group discussion of case studies. - Class presentations by students. 2 X 50	**Material:** Planning for the construction of a wooden building or bridge. **References:** *SNI 7973:2013 Design Specifications for Wood Construction*	0%
16	UAS	UAS	**Criteria:** UAS	UAS 2 X 50	UAS 2 X 50		30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	15%
2.	Test	49%
		64%

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.