Akashi College	Year	2022	Course Title	Structural Analysis ⅡA

Course Information

Course Code	4314	Course Category	Specialized / Compulsory
Class Format	Lecture	Credits	School Credit: 1
Department	Architecture	Student Grade	3rd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	中川肇著：基礎から学ぶ建築構造力学、井上書院　/参考書：大田和彦他：はじめて学ぶ建築構造力学、森北出版		
Instructor	NAKAGAWA Hajime		

Course Objectives

(1)To understand the definition and units of force, to understand and calculate force synthesis/decomposition.
(2)To understand and calculate the balance of force.
(3)To understand the stability and instability of a structure.
(4)To explain the type of load acting on a frame structure.
(5) To calculate the reaction force of various static structures.
(6)To calculate the stress of a static beam and draw a stress diagram.
(7)To calculate the stress of a static frame structure and draw a stress diagram.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	The student can perfectly understands the definition and units of force, and calculate force synthesis/decomposition.	The student can understands the definition and units of force, and calculate force synthesis/decomposition.	The student can not understands the definition and units of force, and calculate force synthesis/decomposition.
Achievement 2	The student can well understand and calculate the balance of force.	The student can understand and calculate the balance of force.	The student can not understand and calculate the balance of force.
Achievement 3	The student well understands the stability and instability of a structure.	The student understands the stability and instability of a structure.	The student doesn't understand the stability and instability of a structure.
Achievement 4	The student can well explain the type of load acting on a frame structure.	The student can explain the type of load acting on a frame structure.	The student can not explain the type of load acting on a frame structure.
Achievement 5	The student can well calculate the reaction force of various static structures.	The student can calculate the reaction force of various static structures.	The student can not calculate the reaction force of various static structures.
Achievement 6	The student can well calculate the stress of a static beam and draw a stress diagram.	The student can calculate the stress of a static beam and draw a stress diagram.	The student can not calculate the stress of a static beam and draw a stress diagram.
Achievement 7	The student can well calculate the stress of a static frame structure and draw a stress diagram.	The student can calculate the stress of a static frame structure and draw a stress diagram.	The student can not calculate the stress of a static frame structure and draw a stress diagram.

Assigned Department Objectives

Teaching Method

Outline	Following the second year of structural mechanics I, the students will continue the study of stress calculation of static structure (especially truss, synthetic rigid frame, arch structure) and the relationship between stress and strain in the cross-section of a structural element, and the property of the cross-section of a structural element. This course instructor has work experience as an architectural structure design engineer. The lessons are in a lecture format and the students will acquire basic knowledge of architectural structural mechanics.
Style	The course proceeds with lectures and exercises. Since Akashi college is a global technical college, structural mechanics technical vocabulary in English will be explained as appropriate. Exams and practices are all in English. The students are required to review after class the content learned.
Notice	Structural analysis is the base to study of reinforced concrete structures and steel structures in the fourth year. The students should show concern with buildings, especially building structures, and listen carefully and take notes during lectures. It is important for the students to solve and understand the exercises at the end of the book by themselves. It is desirable that the students that do not understand the lecture content make questions and deepen their understanding after the class. Since the students are not familiar with the technical terms related to architectural structure mechanics, they will learn through lectures and exercises little by little. Students attendance is required, and only a maximum of 5 absences is excused.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☑ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Explanation of lectures schedule exercises to review the content learned at Structure Analysis I	To assure that the contents acquired in Structure Analysis have been fully understood. To calculate the reaction force and stress of the static determination beam and the rigid frame structure, and draw a stress diagram.
		2nd	Statically determinate truss structure (1): Outline and explanation of the graphical solution	To understand the characteristics of a truss structure. To be able to use the solution method of force diagram and calculate the axial force of a truss structure.

		3rd	Statically determinate truss structure (2): Explanation of the nodal and cutting method	To explain the solution method of the nodal point and the cutting method, and to calculate the axial direction force of the truss structure.
		4th	Statically determinate truss structure (3): practice problems	To practice on the contents learned in the second and third weeks and understand each solving method.
		5th	Synthetic frame structure: outline and solving method	To understand the outline and solving method for synthetic rigid frame structure. To calculate the reaction force and stress, and draw a stress diagram.
		6th	Static arch structure: outline and solving method	To understand the characteristics of an arch structure and its solving method. To calculate the reaction force and stress, and to draw the stress diagram.
		7th	Exercises on synthetic frame structures and arch structures	To solve and understand each solution of exercises problems on the contents learned in the 5th and 6th weeks.
		8th	Mid-term Exam	
	2nd Quarter	9th	Stress and strain degree (1): types of stress degree and their relationship	To understand the definition of stress and strain in the elastic state, and the relationship between force and deformation, and to calculate it.
		10th	Stress and strain degree (2): Types of stress degree, their relationship, and strain types	To understand the definition of stress and strain in the elastic state, and the relationship between force and deformation, and to calculate it.
		11th	Stress and strain degree (3): practice problems	To understand the definition of stress and strain in the elastic state, and the relationship between force and deformation, and to calculate it.
		12th	Properties of the section(1): statical moment of area and graph center	To understand statical moment of area and calculate the graph center for various problems.
		13th	Properties of the section(2): product moment of inertia of area and section modulus	To understand the product moment of inertia of area and calculate the section size for various problems.
		14th	Properties of the section(3): product moment of inertia of area and the principal axis of the section	To understand the polar moment of inertia of area and the principal axis of the section.
		15th	Properties of the section(4): practice problems	To calculate the statical moment of area and the product moment of inertia of area.
		16th	End-term Exam	

Evaluation Method and Weight (%)

	Examination	Assignments	Total
Subtotal	80	20	100
Basic Proficiency	0	0	0
Specialized Proficiency	80	20	100
Cross Area Proficiency	0	0	0