Akashi College	Year	2022	Course Title	Steel Structures A

Course Information

Course Code	4420	Course Category	Specialized / Compulsory
Class Format	Lecture	Credits	School Credit: 1
Department	Architecture	Student Grade	4th
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	高梨晃一、福島暁男共著:基礎からの鉄骨構造 第2版、森北出版		
Instructor	NAKAGAWA Hajime		

Course Objectives

1) To understand and calculate the high strength bolted joint and welded joint of a steel frame structure.
2) To calculate the allowable stress level of steel material, and to design the cross section of a tension material, and compression material.
3) To take photos of actual steel frame structures around the student residence area and to elaborate a report using the knowledge acquired.

Rubric

	Excellent	Standard Level	Unacceptable Level
Achievement 1	Can well explain the characteristics and structure type of Steel structure.	Can explain the characteristics and structure type of Steel structure.	Can not explain the characteristics and structure type of Steel structure.
Achievement 2	Can well explain the mechanism of high strength bolt friction welding.	Can explain the mechanism of high strength bolt friction welding.	Can not explain the mechanism of high strength bolt friction welding.
Achievement 3	Can well explain the types of welding joints and the design method.	Can explain the types of welding joints and the design method	Can not explain the types of welding joints and the design method
Achievement 4	Can well explain what a tension material and its design method.	Can explain what a tension material and its design method.	Can not explain what a tension material or its design method.

Assigned Department Objectives

Teaching Method

Outline	Steel structures have its parts produced in factories, structural elements such as columns and beams, and the framework are assembled in the site by joining those elements with high-strength bolts or welding. In this course, the student will learn the general characteristics of steel materials, their allowable stress, and joining methods such as high-strength bolts and welding. The students will also learn about section design methods for tension, compression, flexural, and materials under deflection and axial tension, as well as the design methods for beams, column joints, and column-beam joints. The course will give examples of how the content learned relates to design and construction work in the real world.
Style	The course will follow the textbook. At the end of each chapter, the students will handle reports. At the free assignment, the students will compare the contents learned in class with steel structure they have observed in the city.
Notice	The course will present as many examples as possible of steel (steel frame) structure. The students should take notes during class and handle our requested assignments. 5 absences will be 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	Type and property of steel material (1) Lecture on the strong and weak points of steel structure. It also explain the type and mechanical property of steel material	To understand the pros and cons of steel structure, types and mechanical properties of steel materials.
		2nd	Type and property of steel material (2) Lecture on the structural design method, load (dead and live load and earthquake load) and allowable stress. The allowable stress is the axial, tension, shear forces and bending moment.	To understand the structural design methods, load, and allowable stress level.
		3rd	High tension bolts friction joint (1) Lecture on the outline of high tension bolts joint and allowable stress.	To understand the basics concepts of high strength bolt joint and Allowable stress level
		4th	High tension bolts friction joint (2) Lecture on the design of high tension bolts joint.	To understand the allowable stress design of high-strength bolted joint.
		5th	High tension bolts friction joint (3) Lecture on the rupture of high tension bolts. Assigment (1)	To understand the rupture test of high strength bolt junction.
		6th	Welding joint (1) Explanation of what is welding joint. Lecture on the kinds of and marks of welding joint.	Explain the outline of welding joining, welded seam, and understand the welding symbols.
		7th	Welding joint (2) Lecture on an allowable stress design of the welding joint. Quiz (1)	To understand the allowable stress level design of the weld seam.

		8th	Mid-term Exam	
	2nd Quarter	9th	Welding joint (3) Lecture on the estimation of the welding joint subjected regarding axial, shear forces and bending moment.	To understand the test of welding seam under axial force, bending and shearing force.
		10th	Welding joint (4) Lecture on an estimation of welding joint's rupture.	To understand the test of fracture of the welded seam.
		11th	Tension member (1) Lecture on the allowable and ultimate design method of the tension member.	To understand the basics about tensile material and allowable stress design method
		12th	Tension member (2) Lecture on an estimation of tension member's rupture.	To explain the examination of the fracture of a tension member.
		13th	Tension member (3) Explanation of an example model of tension member. Assigment (3)	To explain the examples at the end of the textbook. To understand how to design tensile members, studied at weeks 11 and 12.
		14th	Compression member (A-1) It explains the bending buckling of the steel bar. Lecture on the Euler buckling load of the column. Quiz (2)	To experiment on bending the buckling of the rod, and to calculate the buckling load of Euler.
		15th	Compression member (A-2) Lecture on the design equation of compression member.	To understand the design methods for compression materials.
		16th	End-term Exam	

Evaluation Method and Weight (%)

	Examination	Assignments	Quiz	Participation	Portfolio	Other	Total
Subtotal	70	10	10	10	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	70	10	10	10	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0