Tsuyama College		Year	2021			ourse Introduction to Design of Title Machine System Elements			
Course Information									
Course Code	0091		Course Cate	egory Specialized /		ed / Elec	ective		
Class Format	Lecture			Credits		Academic Credit: 2			
Department	Department of Integrated Science and Technology Communication and Informations System Program			Student Grade 4th					
Term	Second Semester Classes per Week 2								
Textbook and/or Teaching Materials	Textbook : Use the same textbook used in Design of Machine Elements I (3rd year)and II (4th year)., Since the textbook describes only the minimum necessary items, students are encouraged to refer to other reference books to deepen their knowledge of related items. Reference books : Many reference books are h in libraries such as the JIS Handbook "Machine Elements" (Japanese Standards Association).						and II (4th year)., Since I to refer to other y reference books are held ociation).		
Instructor	KONISHI Daijiro								
Course Objectives									
Learning purposes : Acquire basic design skills by understanding the basic concept of mechanical design. In addition, acquire the ability to apply knowledge of mechanics and strength of materials to machine element design.									
Course Objectives : 1. From the standpoint of machine element design, explain the basic idea of mechanical design. 2. To explain the types, functions, standards and design methods of the main machine elements. 3. Utilizing knowledge of mechanical materials, strength of materials, mechanics, etc., machine elements can be designed rationally and safely. 4. To explain how tribelogy technology is used in design to control and utilize the "meying" parts of machines									
Rubric						ig puits			
	Excellen	Excollent		Accent		hle		Not acceptable	
Achievement 1	Students knowled issues w logical ju impact of technolo and the taken in in design	s can combine lge to clarify udgments on t of knowledge a ogy on society, results can be to consideration.	the sessence function by register to the sessence function by register to the sessence function by resign targe	n clarify rements and fusing their n understand of its nodeling the t.	nd ir Students can point out requirements and problems with design issues.		nt out I sign	Students can not point out requirements and problems with design issues.	
Achievement 2	Students the esse function product, product quality,	s can understa ence of its by modeling t , and design th considering cost and delive	the product cons quality, cost	t design the sidering and delivery.		s can reasonably he product.		Students can not reasonably design the product.	
Achievement 3	Students and utili design fo their kno mechani technolo	s can understa ze the necessa ormulas from owledge of ics and ogy.	and Students car knowledge o as a means o design soluti	n use their of mechanics of finding ons.	Students use their mechani finding c	dents can generally their knowledge of chanics as a means of ing design solutions.		Students can not use their knowledge of mechanics as a means of finding design solutions.	
Achievement 4	Students the relat the design the conc satisfy the perform machine element	Students can associate the relationship between the design formula with the conditions that can satisfy the function and performance of the machine or machine element.		udents can consider by to control the erformance of machines ad machine elements.		Students can generally consider how to control the performance of machines and machine elements.		Students can not consider how to control the performance of machines and machine elements.	
Assigned Departn	nent Objec	tives							
Teaching Method									
Outline	General or Specialized : Specialized Field of learning : Design and production / management Foundational academic disciplines : Engineering / Mechanical Engineering / Design Engineering / Machine Elements and Tribology-related Relationship with Educational Objectives : This class is equivalent to "(3) Acquire deep foundation knowledge of the major subject area". Relationship with JABEE programs : The main goal of learning / education in this class is "(A) A-2". Course outline : Mechanical design is an intellectual work process that embodies the function required by humans into a								
	flexible way of thinking. The subject of the lecture is to think about "what is machine design", and the basic ideas and methods for designing machines are explained. In particular, in the items of bearings and gears, the relationship with tribology (technology for handling friction, wear, and lubrication) will be explained.								

Style		Course The clas mechan that stu There is There a Grade e Exams	Course method : The class will be conducted using board writing and PowerPoint, paying attention to the relationship with the mechanics required for design. In addition, exercises will be provided according to the progress of learning so that students can deepen their understanding. There is a exercise every lesson. There are assignments that must be submitted. Grade evaluation method : Fxams (70%) + Exercises(30%).						
		Regular is allow	Regular exams will be totally conducted 2 times, and the evaluation ratios will be the same. Only a calculator is allowed for the test. In addition, students with grades of less than 60 may be retested.						
		Precaut Student to comp are offe instruct Course Use the specific experim knowled Therefo	Precautions on the enrollment : Students must take this class (no more than one-third of the required number of class hours missed) in order to complete the 4th year course. This subject is a "subject that requires study outside of class hours". Classes are offered for 15 credit hours per credit, but 30 credit hours are required in addition to this. Follow the instructions of your instructor for these studies. Course advice : Use the same textbook used in Design of Machine Elements I (3rd year)and II (4th year). In order to design a specific machine, not to mention the learning outcomes of the subjects related to design drawing, experimental training, and mechanics, the learning outcomes are required. Therefore, as a preparatory study to be conducted in advance, it is recommended to review these related						
Notice		subjects trends i materia to revie materia	subjects and read the Nikkan Kogyo Shimbun, Nihon Keizai Shimbun, etc. to know the current situation and trends in Japan and overseas regarding mechanical systems. Knowledge of mechanics and strength of materials is required for understanding. Students who are not in the mechanical system system are required to review mechanics and self-learn the contents of study in mechanical design method I and strength of materials.						
		Foundat Introdu Material etc.	oundational subjects : Introduction to Science and Technology (1st year), Materials Technology (2nd), ntroduction to CAD (2nd), Machine Design and Drawing I-II (2nd-3rd), Mechanics I-III (3rd), Strength of 1aterials I (3rd), Mechanism (3rd), Design of Machine Elements I (3rd), Design of Machine Elements II (4th) etc.						
		Related System advance	Related subjects : Machine Design Creative Practice (4th year), Strength of Materials II (4th), Mechanical System Engineering Experiments (4th), Applied Machine Design (5th), Applied Design Engineering (1st year advanced course) etc.						
Attendance advice : Students should fully prepare and review each week's lessons. Originally, mechanical design is a field that emphasizes "comprehensive", so try to learn in relation to the knowledge learned in other subjects. Students are allowed up to 25 minutes late, but attendance beyond this time limit is considered absent.									
Charact	eristics o	of Class	/ Division in Learning			1			
Active	Learning		□ Aided by ICT	☑ Applicable t	o Remote Class	Instructor Professionally Experienced			
Elect	ive m	nust o	complete subjects						
Course	Plan		Thoma		Coals				
			Guidance, Transmission by Belt and	Chain 1	Circular motion can be described using concepts such as angular velocity. Can calculate mechanical work, power, and energy. Explain the means of power transmission using the frictional force generated between the pully and the connector.				
		1st	[Design of Flat Belt Transmission De Learning contents outside class hou (Instructions): • Rotational moveme	evice] rs [Items] ent and power,					
			Selection criteria from the charac driving mechanism with wrapping or Flat belt length and transmission po	teristics of the onnector, • wer					
			Transmission by Belt and Chain 2 [[Belt Transmission Device]	Design of Flat	Be able to calculate the equilibrium of basic rotational force and the combined moment. Understand the means of power transmission using the frictional force generated between the pully and the connector, and be able to calculate the tension and transmission power of the belt. Know the Eytelwein formula. Be able to design the strength of flat belts.				
		2nd	Learning contents outside class hou (Instructions): • Combined moment power transmission by belt transmis • Dimensions of flat belt	rs [Items] z, • Basics of ssion device,					
2nd Semeste	3rd		Transmission by Belt and Chain 3 [7 by V-belt]	Fransmission					
r Quarte	Quarter	3rd	earning contents outside class hours [Items] [Instructions): • Basics of power transmission by '-belt transmission device, • How to use the V- elt		Explain the principle of V-belt wedges using mechanics.				
			Transmission by Belt and Chain 4 [[belt Transmission Device]	Design of V-	From the given specifications, a transmission device using a narrow V-belt can be designed.				
		4th	Learning content outside class hours (Instructions): • Selection of a narro (pulley) that meets the specification	s [Items] ow V-belt is					
			Transmission by Belt and Chain 5 [T by Synchronous Belt, Transmission	[ransmission by Chain]	Roller chain and sprocket can be selected.				
		5th	Learning content outside class hours (Instructions): • Chain and sprocket roller chain	s [Items] t, • Links of					

			ransmission by Belt and Chain 6 [Design of Chain Transmission Device, Continuously Variable ransmission by Belt]			Chains and sprockets can be reasonably selected			
		6th	Learning content of (Instructions): • T chain	earning content outside class hours [Items] Instructions): • Transmission power with a roller hain					
	(G	Clutch, Brake and Claw Wheel 1 [Function and Structure of Power Control Element, Design of Friction Clutch]			Explain the classification of IExplain the function of the power control element and its structure.				
		7th	earning contents outside class hours [Items] Instructions): • Clutch engagement / lisengagement method, classification from perating method, • Determining disk clutch limensions, • Clutch design constraints			Explain the effect of friction on the friction clutch on performance. The transmission torque capacity of the disk clutch can be calculated.			
		8th	2nd semester mid	-term exam					
	Oth F	Return and comme Brake and Claw W of Power Control E	entary of exam a /heel 2 [Function :lement]	nswers, Clutch, and Structure	Explain the effect of brake friction on				
	901	Learning content c (Instructions): • B Friction material	outside class hour rake effectivenes	rs [Items] s factor, •	ıs] r, ·				
			Clutch, Brake and Claw Wheel 3 [Brake Design, Claw Wheel]			Understand the types of block brakes and drum brakes, and calculate brake torque. Understand the type of band brake and calculate the brake torque.			
		10th	Learning contents outside class hours [Items] (Instructions): • Block brake braking force, • Drum brake braking force						
đth		Spring 1 [Functions of Energy Storage Element / Buffer Element, Type of Spring, Torsion Bar Spring, Strength Design of Cylindrical Coiled Spring]			Explain the function, type, and characteristics of springs. Explain the role of shock absorbers and dampers. Explain the role of spring types and uses. Design a spring with the understanding that it is				
	11th	Learning contents outside class hours [Items] (Instructions): • Characteristics of various springs, • Spring as an energy storage element, • Spring characteristics of torsion bar spring, • Spring strength design			an element that stores and restores energy to itself. Explain the acting force and stress of the compression cylindrical coiled spring from the viewpoint of strength of materials.				
	Quarter	r 12th	Spring 2 [Spring Characteristics of Cylindrical Coiled Springs, laminated leaf springs and other springs] Learning content outside class hours [Items]			The amount of deflection when a tensile or compressive load is applied to a coil spring of any material, wire diameter, and number of turns can be obtained.			
			(Instructions): • S Spring 3 [Laminate	pring characteris ed Leaf Springs a	tics	A beam of uniform strength can be designed (leaf spring).			
		13th	Springs] Learning content of (Instructions): • R	outside class hour	rs [Items] een load and				
			deflection / stress						
		14th	Pipes, Pipe Joints, Valves [Types and Uses of Pipes, Selection Methods of Pipes, Pipe Joints,, Types and Uses of Valves] Learning contents outside class hours [Items]			Explain the types and characteristics of pipelines, pipe joints and valves. Pipes used for pipelines such as fluid transportation can be selected.			
			Clastructions): • Average flow velocity of pipes, • Selection of pipe dimensions, • Pipe screws, • Pipe line design			Safety, maintenance, operability, etc. can be considered when designing the pipeline.			
		15th	(2nd semester final exam)						
16th R		Return and commentary of exam answers							
Evaluation Method and Weight (%)									
E		Examination	Exercises	Mutual Evaluations between students	Behavior	Portfolio	Mini test	Total	
Subtotal		70	30	0	0	0	0	100	
Basic Proficiency	Basic Proficiency 0		0	0	0	0	0	0	
Specialized Proficiency		70	30	0	0	0	0	100	
Cross Area Proficiency)	0	0	0	0	0	0	