

Tsuyama College		Year	2021		Course Title	Applied Machine Design
Course Information						
Course Code	0162		Course Category	Specialized / Elective		
Class Format	Lecture		Credits	Academic Credit: 2		
Department	Department of Integrated Science and Technology Electrical and Electronic Systems Program		Student Grade	5th		
Term	First Semester		Classes per Week	2		
Textbook and/or Teaching Materials	Textbooks : "Sin Kikai Seizu Enshuu, Haguruma Zou-Gensokuki/Yuastu Jyakki/Douryoku Winch" (Ohmsha), Reference books : "JIS Handbook Kikai Youso" (Japanese Standards Association)					
Instructor	SHIOTA Hirohisa					
Course Objectives						
Learning purposes : Acquire the ability to carry out practical mechanical design by using hardware and software such as CAD.						
Course Objectives : 1. To acquire the ability to design machine elements rationally and safely by utilizing the various knowledge and techniques learned up to this point. 2. To acquire the ability to conceptualize a solution to a problem and to express the conceptualization in diagrams, sentences, expressions, program.						
Rubric						
	Excellent	Good	Acceptable	Not acceptable		
Achievement 1	The students can design various types of machine elements by using the knowledge and skills they have learned and referring to appropriate materials.	The student can design various machine elements by utilizing the knowledge and skills learned up to this point, while investigating and referring to appropriate materials.	The student can design various machine elements according to the instructed procedure by using the various knowledge and techniques learned up to this point.	The student will not try to apply the knowledge and skills learned so far to the design of machine elements.		
Achievement 2	The students can conceptualize and express their ideas in diagrams, sentences, formulas, programs, and other effective ways to solve problems.	The student can conceptualize a solution to a problem and express their conceptualization in diagrams, sentences, formulas, programs, and other effective ways.	The students can conceive of a solution to a problem and express their conceptions in a specified way, such as diagrams, sentences, formulas, and programs.	The student will not try to conceive of a solution to the problem and will not try to express their ideas in diagrams, sentences, formulas, programs, etc.		
Assigned Department Objectives						
Teaching Method						
Outline	General or Specialized : Specialized Field of learning : Materials, Design and Production Required, Elective, etc. : Elective must complete subjects Foundational academic disciplines : Engineering,/Mechanical Engineering,/Design Engineering, Machine Functional Elements, Tribology 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 are "(A), A-2", also "C-1" is involved. Course outline : The design task is a two-stage helical gear reducer, and each person is given specifications for transmission power and reduction ratio, and each person completes a design calculation and a manufacturing drawing (assembly drawing and parts drawing) based on the design calculation. In this process, while understanding the design procedure, design calculation method, and various standards, the knowledge of machine design method and machine construction method learned so far and the knowledge of drafting are acquired a method for machine realization.					
Style	Course method : Each person will proceed with the design according to the text and lectures on the blackboard. Necessary materials other than the text will be prepared. After the design document is completed, the student will start creating drawings using CAD (hardware and software). The design calculation sheet and drawing will be submitted and returned with comments as appropriate. Then, each person should complete the design calculation sheet and drawing while making trajectory corrections as necessary. Grade evaluation method : Evaluation of the learning process in the design of a gearbox through exercises (10%). Design calculations are submitted in the form of a report, and drawings are submitted in the form of a CAD data file and printed drawings. Evaluate the submitted design calculation (40%) and drawings (50%). Only those who have submitted all of the exercises, design calculation sheets and drawings will be evaluated. Failure to submit any of the above items will result in a failing grade.					

Notice	Precautions on the enrollment : This is a "class that requires study outside of class hours". Classes are offered for 15 hours per credit, but 30 credit hours are required in addition to this. Follow the instructions of your instructor for these studies.
	Course advice : Knowledge about mechanical elements such as gears, shafts, bearings, and keys, knowledge for operating design solutions, knowledge for controlling the design process, etc. are required. Make sure you understand the contents of related basic subjects so that you can use.
	Foundational subjects : All subjects related to materials, manufacturing technology and machine design and drawing
	Related subjects : Advanced Design Engineering (Advanced Engineering Course 1st year), Precision Machining (Advanced Engineering Course 1st)
	Attendance advice : Do not miss classes. Complete the design of each unit within the specified period. You must be late for up to 25 minutes, and if you exceed this, you will be considered absent.

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	Guidance[Basic knowledge of increase-reduction gear design] Basic design [Design specifications, Reduction ratio, Transmission power and torque]	Understand the basics and design of gearboxes, as well as an overview of the overall design according to the given specifications.
		2nd	Design calculation of gear	Understand the design procedures and methods of gears, which are the main elements of gearboxes.
		3rd	Creation of an overall conceptual diagram (plan) 1	Understand how to create an overall conceptual diagram (plan).
		4th	Creation of an overall conceptual diagram (plan) 2	Understand how to create an overall conceptual diagram (plan).
		5th	Design of shafts 1 [Creation of conceptual drawing of input shaft, intermediate shaft, and output shaft].	Understand how to create a conceptual diagram of an axis.
		6th	Design of shafts 2 [Study of forces and diameters acting on shafts and bearings].	Understand the design procedures and methods for shafts and bearings.
		7th	Design of bearing	Understand the design procedures and methods for shafts and bearings.
		8th	Summary of bearing design Design of key	Understanding of design procedures and methods for shafts, bearings and related elements.
	2nd Quarter	9th	Drawing by CAD based on design 1	Understand CAD drawings of the various mechanical elements included in gearboxes through CAD drawing of gearboxes.
		10th	Drawing by CAD based on design 2	Understand CAD drawings of the various mechanical elements included in gearboxes through CAD drawing of gearboxes.
		11th	Drawing by CAD based on design 3	Understand CAD drawings of the various mechanical elements included in gearboxes through CAD drawing of gearboxes.
		12th	Drawing by CAD based on design 4	Understand CAD drawings of the various mechanical elements included in gearboxes through CAD drawing of gearboxes.
		13th	Drawing by CAD based on design 5	Understand CAD drawings of the various mechanical elements included in gearboxes through CAD drawing of gearboxes.
		14th	Drawing by CAD based on design 6	Understand CAD drawings of the various mechanical elements included in gearboxes through CAD drawing of gearboxes.
		15th	1st semester final exam (Regular exam is not conducted in this subject)	
		16th	Drawing by CAD based on design 7	Understand CAD drawings of the various mechanical elements included in gearboxes through CAD drawing of gearboxes.

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Exercise [Drawing]	Exercise [Design calculation]	Exercise [Practice exercise]	Total
Subtotal	0	0	0	50	40	10	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	0	0	0	50	40	10	100
Cross Area Proficiency	0	0	0	0	0	0	0