

Tsuyama College		Year	2021		Course Title	Methods of Scientific Experiments
Course Information						
Course Code	0001		Course Category	Specialized / Elective		
Class Format	Lecture		Credits	Academic Credit: 2		
Department	Advanced Electronics and Information System Engineering Course		Student Grade	Adv. 1st		
Term	First Semester		Classes per Week	2		
Textbook and/or Teaching Materials	Textbooks : Introduction to the Daguchi Method" by Kazuo Tatebayashi (JUSE)					
Instructor	YAMAGUCHI Daizo,KAWAI Masahiro					
Course Objectives						
Learning purposes : Students will learn about the Taguchi Method, a technique developed from the Design of Experiments, in order to be able to carry out appropriate and reliable experiments and develop techniques.						
Course Objectives : 1. Understand the role and concept of parameter design and be able to explain the procedure. 2. Understand the concept and explain the procedure of parameter design of dynamic characteristics. 3. To understand the parameter design in the technology development stage.						
Rubric						
	Excellent	Good	Acceptable	Not acceptable		
Achievement 1	Understand the role and concept of parameter design and be able to explain the procedure.	Understand the role and concept of parameter design and its procedures.	Understand the role and concept of parameter design and its procedures from the material.	Not reached the left column.		
Achievement 2	Understand the concept of parameter design of dynamic characteristics and be able to explain the procedure.	Understand the concept and procedure of parameter design of dynamic characteristics.	Understand the concept and procedure of parameter design of dynamic characteristics by looking at the material.	Not reached the left column.		
Achievement 3	Understand the parameter design in the technology development phase.	Understand the design of parameters at the technology development stage by looking at the material.	Understand, with the advice of a supervisor, the design of parameters in the technological development phase, looking at the material.	Not reached the left column.		
Assigned Department Objectives						
Teaching Method						
Outline	General or Specialized : Specialized Field of learning : Basic and Common Natural Sciences Foundational academic disciplines : Relationship with Educational Objectives : This class is equivalent to "(1) Cultivate human creative talent, rich in practical abilities". Relationship with JABEE programs : The main goals of learning / education in this class are "(A), A-1, also "A-2" and "A-3" is involved. Course outline : In the natural sciences, where demonstration and reproducibility are important, experimentation is one of the most important means of natural cognition. In this course, students will learn about the Taguchi Method, a technique that evolved from the Design of Experiments method, in order to be able to carry out appropriate and reliable experiments and to develop techniques.					
Style	Course method : Lectures will be based on the textbook. Exercises will be given on the computer as students progress to deepen their understanding. Grade evaluation method : (1) Distribution of marks: Examination (report method) 100%. (2) Evaluation criteria: Students will be evaluated on the basis of their basic content and understanding of the items listed in the achievement objectives and their basic application. 60 points or more is a passing score. (3) Re-examination: Students who score less than 60 points will be re-examined if the teacher deems it necessary.					

Notice	Precautions on the enrollment : In addition to the 15 credit hours per credit, students are required to study 30 credit hours. Students are expected to follow the instructions of their teachers regarding these studies.
	Course advice : Students are expected to take an active role in acquiring knowledge in a wide range of fields, including some that are not their own. It is essential that students prepare for the course by studying and reviewing, and that they maintain an interest in technological development and quality control.
	Foundational subjects : Experiments and graduation theses in the department (2nd-5th years).
	Related subjects : Special Study on Mechanical and Control Systems Engineering I, II (1st and 2nd year), Special Study on Electronic and Information Systems Engineering I, II (1st and 2nd), Special Experiment on Mechanical and Control Systems Engineering (1st), Special Experiment on Electronic and Information Systems Engineering (1st).
	Attendance advice : In the lectures, various examples of case studies will be given so that students can learn how to think about them. Late arrival after 15 minutes from the start of a credit hour will result in an absence from class.

Characteristics of Class / Division in Learning

☒ Active Learning	☒ Aided by ICT	☒ Applicable to Remote Class	☒ Instructor Professionally Experienced
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Elective subjects

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Guidance, Chap1 system and stability (Study outside class time: Assignment (1) Chap1)	To be able to understand engineered systems.
		2nd	Chap2 Introduction to Parameter Design 1 (Study outside class time: Assignment (2) Chap2)	Be able to understand the role, concepts and procedures of parameter design.
		3rd	Chap2 Introduction to Parameter Design 2 (Study outside class time: Assignment (2) Chap2)	Be able to understand examples of desirable parameter design.
		4th	Chap3 Parameter design of dynamic characteristics 1 (Study outside class time: Assignment (3) Chap3)	Understand the concept and procedure of parameter design of dynamic characteristics.
		5th	Chap3 Design of kinetic parameters 2 (Study outside class time: Assignment (3) Chap3)	Be able to understand the types of dynamic characteristics and how to calculate the signal-to-noise ratio.
		6th	Chap 4: Parameter design in the technology development phase 1 (Study outside class time: Assignment (4) Chap 4)	Be able to understand the design of parameters by objective function and technical means.
		7th	Chap 4: Parameter design in the technology development phase 2 (Study outside class time: Assignment (4) Chap 4)	Be able to understand examples of parameter design with basic functions.
		8th	1st semester mid-term exam	
	2nd Quarter	9th	Chap5 Parameter design for nonlinear systems, Chap6 Parameter design when input/output cannot be measured (Study outside class time: Assignment (5 and 6) Chap5 and 6)	Be able to understand an example where the goal is to have a non-linear relationship between inputs and outputs. Understand the parameter design using the dynamic functional window method.
		10th	Chap7 Designing parameters when input and output cannot be measured (Study outside class time: Assignment (7) Chap7)	Be able to understand software debugging using orthogonal tables.
		11th	Chap8 Loss function and its use 1 (Study outside class time: Assignment (8) Chap8)	Be able to understand the tolerance design of systems using loss functions.
		12th	Chap8 Loss function and its use 2 (Study outside class time: Assignment (8) Chap8)	Be able to understand the loss functions of the desirability and desirability characteristics.
		13th	Chap9 MT System 1 (Study outside class time: Assignment (9) Chap9)	Be able to understand the concept and technical challenges of anomaly determination.
		14th	Chap9 MT System 2 (Study outside class time: Assignment (9) Chap9)	Be able to understand the use of Mahara's bis distance in MT systems.
		15th	Chap10 Taguchi Method and Development Process Reform (Study outside class time: Assignment (10) Chap10)	Explain the problems with current development methods and the status and results of organisational use of the Taguchi Method.
		16th	Summary	

Evaluation Method and Weight (%)

	Examination (Report)	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	100	0	0	0	0	0	100
Basic Proficiency	50	0	0	0	0	0	50
Specialized Proficiency	50	0	0	0	0	0	50
Cross Area Proficiency	0	0	0	0	0	0	0