

Tsuyama College		Year	2021		Course Title	Power Electronics	
Course Information							
Course Code	0028		Course Category		Specialized / Elective		
Class Format	Lecture		Credits		Academic Credit: 2		
Department	Advanced Electronics and Information System Engineering Course		Student Grade		Adv. 2nd		
Term	First Semester		Classes per Week		2		
Textbook and/or Teaching Materials	Textbook: Ned Mohan et al. Power Electronics (John Wiley & Sons, Inc.)						
Instructor	KOBAYASHI Toshiro						
Course Objectives							
Learning purposes : Understand the principles and features of various power conversion circuits, power devices, and control methods, and learn the principles of power conversion.							
Course Objectives 1. Understand the application area and application field. 2. Understand power devices and control methods. 3. Understand the operating principle of major power conversion circuits.							
Rubric							
	Excellent		Good		Acceptable		Not acceptable
Achievement 1	Be able to explain concretely the industrial application areas and application fields.		Explain basic application areas and application fields.		Understand basic application areas and application fields.		It has not reached the left.
Achievement 2	Explain in detail the types, structures and features of power devices and control methods.		Explain basic power devices and control methods.		Understand power devices and control methods.		It has not reached the left.
Achievement 3	Explain in detail the concept, types and operating principles of power conversion circuits.		Explain the operating principle of basic power conversion circuits		Understand the operation of basic power conversion circuits.		It has not reached the left.
Assigned Department Objectives							
Teaching Method							
Outline	General or Specialized : Specialized Field of learning : Electrical / Information / Control Foundational academic disciplines : Engineering / Electrical and Electronic Engineering / Power Engineering / Electrical Equipment Engineering Relationship with Educational Objectives : This class is equivalent to a learning goal in advance course "(2) Acquire knowledge in specialized technical fields related to electricity / electronics, information / control, and acquire the ability to utilize it for the design / policy / operation of machines and systems." Relationship with JABEE programs : The main goals of learning / education in this class is "(A) Deepening basic knowledge about technology, A-2 : To be able to acquire and explain the knowledge of specialized technical fields related to "electricity / electronics" and "information / control". " Course outline Understand the basic characteristics of power devices and the operating principles of typical circuits for power electronics technology widely used in industry. Students will also learn the basics of technology applied to various applications. Use English texts to improve technical English reading comprehension.						
Style	Course method : Classes are conducted in the form of each student presenting the shared part. Report and exercise as appropriate to deepen understanding. Grade evaluation method : Presentation content ・ Evaluate based on presentation materials (40%) and assignments (60%).						

Notice	Precautions on the enrollment : This is a class that requires study outside of class hours. A total of 45 hours of study is required per credit, including both class time and study outside class time. Follow the instructions of the instructor regarding study outside of class hours.
	Course advice : As a preparatory study to be conducted in advance, the lecture will be given on the assumption that the basics of semiconductor power conversion have already been taken. In semiconductor power conversion circuits, it is important to understand the operation of inductors and capacitors, which are the basic elements of electric circuits.
	Foundational subjects : Electrical and Electronic Basics II (2nd Year), Electronic Engineering (3rd), Electrical Circuit I, II (3rd, 4th), Electrical Equipment I, II (2nd, 3rd)
	Related subjects : Electrical and electronic equipment (1st in advanced course)
	Attendance advice : Rather than the passive attitude of listening to the lecture, the lesson is regarded as a place to announce the results of the preparation and exchange opinions with teachers and other students, or as a place to ask questions and comments to the presenter from a critical point of view. If it is within 25 minutes of the start of class, it will be late, and 3 times late will result in 1 absence.

Characteristics of Class / Division in Learning

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

E l e c t i v e s u b j e c t s

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Guidance	Understand the following contents respectively
		2nd	Power electronics concept	Explain what power electronics are.
		3rd	Features and fields of application	Explain the application fields of power electronics.
		4th	Basic components	Explain the basic circuit configuration.
		5th	Concept of operation and advantages and disadvantages	Explain the concept of operating principle.
		6th	About various power devices	Explain the types of power semiconductor elements.
		7th	Diode, thyristor	Explain the operating characteristics of diodes and thyristors.
		8th	Power transistor	Explain the operating characteristics of power transistors.
	2nd Quarter	9th	Power MOSFET	Explain the operating characteristics of power MOSFETs.
		10th	GTO, IGBT, etc.	Explain the operating characteristics of GTO and IGBT.
		11th	What is a power conversion circuit?	Explain the operating principle and application of power conversion circuits.
		12th	Converters and various formulas	Explain the outline and method of the converter.
		13th	Step-down converter	Explain the configuration and principle of the step-down converter.
		14th	Boost converter	Explain the configuration and principle of the step-up converter.
		15th	(Final test)	
		16th	Inverter and various methods	Explain the configuration and principle of the inverter.

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	0	40	0	0	60	0	100
Basic Proficiency	0	20	0	0	30	0	50
Specialized Proficiency	0	20	0	0	30	0	50
Cross Area Proficiency	0	0	0	0	0	0	0