

Tsuyama College		Year	2020		Course Title	Introduction to Robotics	
Course Information							
Course Code		0098		Course Category		Specialized / Elective	
Class Format		Lecture		Credits		Academic Credit: 2	
Department		Department of Integrated Science and Technology Advanced Science Program		Student Grade		4th	
Term		Second Semester		Classes per Week		2	
Textbook and/or Teaching Materials		"Robotics" by the Japan Society of Mechanical Sciences (Maruzen Publishing Co., Ltd.) / Distribution Prints, etc.					
Instructor		NONAKA Shogo					
Course Objectives							
[Purpose of study] The purpose of this study is to acquire basic knowledge of robotics, such as general robot functions, configurations, operations, driving and control methods.							
[Goal] 1. Understand and explain the functions, configurations, operations, driving and control methods required for robots. 2. Learn how to design a machine, how to measure physical quantities, and the basics of machine control. 3 . We can understand engineering issues, consider the health and safety of the public, and create design solutions (systems, components, and processes) to solve them while taking into consideration cultural, social, and environmental perspectives.							
Rubric							
	Ideal Level		Standard Level		Acceptable Level		Unacceptable Level
Achievement 1	Students can properly understand and explain in their own words the functions, configurations, operations, driving and control methods required for robots.		We can generally understand the functions, configurations, operations, driving and control methods required for robots, and explain them easily using words such as textbooks.		We can generally understand the functions, configurations, operations, driving and control methods required for robots, and explain them with hints from textbooks and reference books.		The basic knowledge of the functions, configuration, operation, driving and control methods required for robots is insufficient to explain.
Achievement 2	Students can independently learn the methods of mechanical design related to robotics, how to measure physical quantities, and the basics of machine control, and apply their knowledge.		Students can independently learn the methods of mechanical design related to robotics, how to measure physical quantities, and the basics of machine control, and utilize their knowledge.		Students can independently learn the methods of mechanical design related to robotics, how to measure physical quantities, and the basics of machine control.		It is not possible to independently learn the methods of mechanical design related to robotics, the method of measuring physical quantities, and the basics of machine control.
Achievement 3	Students can understand engineering issues in robotics, learn from public health and safety considerations, cultural, social, and environmental perspectives, and create design solutions (systems, components, and processes) to solve problems.		Students can understand engineering issues in robotics, learn from public health and safety considerations, cultural, social, and environmental perspectives, and present and discuss processes for solving problems.		Students can understand the engineering issues in robotics and learn from the viewpoints of public health and safety, as well as cultural, social, and environmental perspectives.		Students cannot understand the engineering issues in robotics and learn from the consideration of public health and safety, as well as cultural, social, and environmental perspectives.
Assigned Department Objectives							
Teaching Method							
Outline	[Other than general and specialized] [Field of Study] Energy, Measurement and Control [Subject Grade] 4 years Robotics Program [Required, Required, Course Selection, Selection] Course Selection [Basic Academic Field] Engineering/Mechanical Engineering, Electrical and Electronic Engineering, Information Engineering, Control Engineering [Related to Departmental Learning and Educational Goals] This subject is the learning education goal of the Faculty of Science and Engineering "(3) Deepening of the basic expertise". [Relationship with engineer education program] The goal of this course is to deepen basic knowledge of (A) technology, A-2: "Materials and Structures," "Energy and Flow," "Information and Measurement and Control," "Design, Production and Management," and "Machines and Systems." [Overview of the class] We will explain how robots are made, how they are moved, and what properties they have by disassembling robots with the aim of deepening their expertise in the field of mechanical design and measurement control. In addition, the movement mechanism of the robot and the methodology and idea for realizing the function are shown, and the measurement and control technology such as the sensor which is a component of the robot is explained.						

Style	<p>[Method of the class] The class will be conducted mainly on the board, but it will be easier to understand the contents of the lecture through exercises, etc. In addition, by using materials such as materials and videos as appropriate to be aware of the relationship with actual technology, and by performing appropriate group work, students will have the opportunity to learn independently.</p> <p>[Evaluation method] 4 regular exams (or reports) are evaluated equally (70%). In addition, evaluate exercises and group work (30%). Depending on the situation, the test may be re-tested, but the evaluation is up to 60 points. The evaluation method will be explained in class.</p>
Notice	<p>[Notes on the course] This course is a subject that requires students to study outside of class hours. Classes are offered for 15 credit hours per credit, but in addition to this, learning of 30 credit hours is compulsory. Follow the instructions of your faculty member about these learnings.</p> <p>Advice: The basics of robotics are based on mathematics, control engineering, physics, etc., but it is desirable to review the basic subjects listed below.</p> <p>Basic Subjects: Mechanical Design Drafting I. (2 years), Basic Linear Algebra (2 years), Material Mechanics I. (3 years), Mechatronics I. (3 years), Mechanical Design Drafting II (3 years), Material Mechanics II (4 years), Applied Mathematics I.II. (4 years), Control Engineering (4 years) Mechatronics II.(4 years) [Related Subjects] Robot Creation Exercise (4 years), Robotics Design (5 years), Robot Programming (5 years), Robot Control (5 years), Applied Design Engineering (Special 1), Control Equipment (Special Topics 1), Applied Control Engineering (Special 2)</p> <p>[Advice on Taking] The robotics range of industrial technologies involved is very broad and closely related to many fields. Therefore, I would like you to attend the lecture in perfect condition, such as reviewing basic subjects. Also, prepare a calculator for the exercise. For lateness, the number of late lessons will be applied according to the situation until 60 minutes after the start, but after that, it will be treated as a division. This course is related to mechatronics human resource development.</p>

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Guidance (including syllabus description), history and concepts of robotics	Get an overview of robotics
		2nd	Introduction of the latest trends in robot development, components and roles of robots	Understand the latest trends, components, and roles of robots.
		3rd	Decomposition (1): Robot work and function	Understand the robot's work and functions.
		4th	Decomposition (2): Functions and components of robots, components and structures, etc.	Understand the structure of the robot's functions and components, as well as its components.
		5th	Moving (1): Forms and Principles of Mobile Robots	Understand the movement form of the robot and the principle of each form.
		6th	Moving (2): Wheel-moving robot	Understand the movement principle and theory of wheel-moving robots.
		7th	Moving (3): Two-legged and multi-legged walking	To understand the principles, classifications, and theories of walking in leg-type robots.
		8th	(Late Interim Examination)	I can explain what I'm up to now.
	4th Quarter	9th	Return of the interim exam and explanation of the answers	The same as above.
		10th	Working (1): Type and use of work, driving system	To understand the type and use of robot work, and the driving method for this.
		11th	Working (2): Motorism of Plane Manipulators	Understand the molasses of plane manipulators.
		12th	Working (3): Statics and Dynamics of Plane Manipulators	Understand the statics and dynamics of plane manipulators.
		13th	Measuring (1): Robots, Sensors, and Finding Object	To understand how to discover sensors and object used by robots.
		14th	Measuring (2): Measuring distance, shape, amount of rotation, force, and posture	Understand the measurement methods and theories of the physical quantity required for the robot's posture and work.
		15th	(Post-term examination)	I can explain what I'm up to now.
		16th	Return of the test results of the final examination and explanation of the answers	The same as above.

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	70	0	0	0	30	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	70	0	0	0	20	0	90
Cross Area Proficiency	0	0	0	0	10	0	10