

Toyama College		Year	2023		Course Title	Industrial materials II	
Course Information							
Course Code		0167		Course Category		Specialized / Compulsory	
Class Format		Lecture		Credits		School Credit: 1	
Department		Department of Maritime Technology		Student Grade		5th	
Term		Second Semester		Classes per Week		2	
Textbook and/or Teaching Materials							
Instructor		Mizutani Junnosuke					
Course Objectives							
At the completion of this course, students will be able to: 1) understand types of structural steels and steels for tools. 2) explain mechanism of electrochemical corrosion. 3) understand traditional and current manufacturing process of aluminum.							
Rubric							
		Ideal Level of Achievement (Very Good)		Standard Level of Achievement (Good)		Unacceptable Level of Achievement (Fail)	
Evaluation 1		Can understand killed steel and rimming steel; and relation between refining and type of steels		Can understand types of structural steels and steels for tools		Can't understand the difference between SS steels and SC steels	
Evaluation 2		Can explain relation between Cr-Ni components and passivation		Can explain mechanism of electrochemical corrosion		Can't understand characteristics of stainless steels	
Evaluation 3		Can understand aging effect of aluminum alloys and alumite treatment		Can understand traditional and current manufacturing process of aluminum		Can't understand types and characteristics of light metals	
Assigned Department Objectives							
MCCコア科目							
Teaching Method							
Outline		This course is designed to provide students with basic knowledge: (1) Of properties of various major metals used as materials for mechanical parts. (2) Required for engineers who manage fuels and lubricating oils.					
Style		Lectures and exercises by an instructor					
Notice		Students are required to submit a brief report at the end of every lecture/exercise. The contents of these reports will be reflected in the subsequent lecture/exercise. Students who earned less than 60 points may be given a chance to sit for an extra exam upon request if there is a justifiable reason. 60 points will be given to those students who are assumed to be complete the course based on the results of such extra exam. This is an obligatory course to obtain the license of Third grade maritime officer (Engine) at training schools designated by the Law of Maritime Officers as the subject on Engine Part 3 Material Engineering.					
Characteristics of Class / Division in Learning							
<input type="checkbox"/> Active Learning		<input type="checkbox"/> Aided by ICT		<input type="checkbox"/> Applicable to Remote Class		<input type="checkbox"/> Instructor Professionally Experienced	
Course Plan							
			Theme		Goals		
2nd Semester	3rd Quarter	1st	[Lecture] - Explanation of syllabus - Surface hardening with and without changing chemical compositions - Surface hardening with and without changing chemical compositions		Can understand the concepts of cementation and nitriding; and surface quenching and shot peening.		
		2nd	[Lecture] - Steels for tools		Can understand characteristics of rolled steels for general structure and carbon steels for mechanical structure.		
		3rd	[Lecture] - Corrosion of steels and methods for anticorrosion		Can understand characteristics of steels for tools, bearing steels and spring steels.		
		4th	[Lecture] - Corrosion of steels and methods for anticorrosion		Can understand electrochemical reaction of steel surface by water and meanings of passivation and sacrificial anode.		
		5th	[Lecture] - Stainless steels		Can understand characteristics and applications of various types of stainless steels.		
		6th	[Lecture] - Cast irons		Can understand characteristics, classification and application of cast irons.		
		7th	[Lecture] - Copper and its alloys		Can understand types and application of copper alloys, and precautions for use.		
		8th	[Mid-term exam]		Can demonstrate knowledge of characteristics of steels, cast irons and copper alloys.		
	4th Quarter	9th	[Answers and explanation for mid-term exam] [Confirmation of results] [Lecture] - Light metals		Can understand characteristics and usages of light metals.		

		10th	[Lecture] - Production of aluminum	Can understand history of industrial aluminum production and characteristics of aluminum.
		11th	[Lecture] - Surface treatment of aluminum alloys	Can understand aging effect of aluminum alloys and characteristics of aluminum alloys for casting and extension.
		12th	[Lecture] - Magnesium·Titan and its alloys	Can understand production, characteristics and usage of Magnesium·Titan.
		13th	[Lecture] - Sintered alloys, ceramics and functional materials	Can understand production, characteristics and usage of sintered alloys, ceramics and functional materials.
		14th	[Lecture] - Properties of fuel and lubricant	Can understand types; physical and chemical properties; test methods; and effects of additives.
		15th	[Final exam]	Can demonstrate knowledge of characteristics and usage of various nonferrous metals.
		16th	[Answers and explanation for final exam] [Confirmation of results] [Questionnaire (Evaluation of lectures)]	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	80	0	0	0	0	20	100
Basic Ability	0	0	0	0	0	0	0
Technical Ability	80	0	0	0	0	20	100
Interdisciplinary Ability	0	0	0	0	0	0	0