Toyama College	Year	2022	Course Title	Auxiliary Machinery Ⅰ

Course Information

Course Code	0120	Course Category	Specialized / Compulsory
Class Format	Lecture	Credits	School Credit: 1
Department	Department of Maritime Technology	Student Grade	4th
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	Marine Engines 2　Jikkyo Shuppan		
Instructor	Kobayashi Dai		

Course Objectives

To understand the overview of the basic principles, structure and equipment of refrigerating machines and pumps.

Rubric

	理想的な到達レベルの目安	標準的な到達レベルの目安	未到達レベルの目安
Evaluation Item 1	Can properly explain the overview of the basic principles, structure and equipment of refrigerating machines and pumps.	Can somewhat explain the overview of the basic principles, structure and equipment of refrigerating machines and pumps.	Cannot explain the overview of the basic principles, structure and equipment of refrigerating machines and pumps.

Assigned Department Objectives

MCCコア科目

Teaching Method

Outline	The auxiliary devices to operate a ship are generic names of the larger parts of the machine other than the propulsion engine, main boiler and electrical equipment. Students will be able to properly understand what equipment they will first be in charge of as a member of the ship's crew. Students will learn about the operating principles, features and comparisons of the refrigerating cycle and various pumps.
Style	Lectures and exercises
Notice	Students whose evaluations are less than 60 points for the lecture content as a course subject required for training institutions based on the Act on Ships' Officers may take a make-up exam upon request. Students whose acquisition of units is acknowledged as a result of the make-up test will receive a score of 60 points.

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 with the syllabus •Overview of refrigeration equipment①	•To understand the content of the lecture explanations •To understand the positioning of refrigeration of marine auxiliary equipment
		2nd	•Overview of refrigeration equipment② Refrigerant and brine	•To understand the gas compressor refrigerating cycle •To understand about refrigerants and brine
		3rd	•Types of P-H diagrams and compressors	•To understand the Mollier diagram and practice basic calculations •To understand the types of compressors
		4th	•Overview of the structure of gas compressor refrigerating machines①	•To understand the structure of compressors, condensers, expansion valves and evaporators
		5th	•Overview of the structure of gas compressor refrigerating machines② Automatic control device	•To understand the operation of safety valves, electromagnetic valves and pressure switches, etc.
		6th	•Operation and maintenance of refrigerating machines Malfunctions and their causes	•To understand the properties of coolant and refrigerating machine oils •To understand the malfunction causes and countermeasures of refrigerating equipment
		7th	•Practice maritime test problems	•To practice and explain Level 2 maritime test problems
		8th	•Mid-term exam	
	2nd Quarter	9th	•Explanation of the mid-term exam •Overview of pumps	•To understand the classifications, applications and various elements of pumps
		10th	•Theory of centrifugal pumps①	•To understand the lifting theory and characteristic curves of centrifugal pumps
		11th	•Theory of centrifugal pumps②	•To understand the comparative rotations and usage examples of centrifugal pumps •To understand the flow equalization method of centrifugal pumps
		12th	•Theory of centrifugal pumps③	•To understand the operation methods and characteristic curves of centrifugal pumps
		13th	•Theory of centrifugal pumps④	•To understand the cavitation of centrifugal pumps •To understand the starting characteristics of centrifugal pumps
		14th	•Practice maritime test problems	•To practice and explain Level 2 maritime test problems

		15th	•Final exam	•Final exam
		16th	•Answers to the final exam	•Return answer sheets

Evaluation Method and Weight (%)

	試験	発表	相互評価	態度	ポートフォリオ	提出物	Total
Subtotal	90	0	0	5	0	5	100
基礎的能力	30	0	0	0	0	0	30
専門的能力	60	0	0	5	0	5	70
分野横断的能力	0	0	0	0	0	0	0