Toyama College	Year	2023	Course Title	Internal Combustion Engine Engineering A

Course Information

Course Code	0099	Course Category	Specialized / Compulsory
Class Format	Lecture	Credits	School Credit: 1
Department	Department of Maritime Technology	Student Grade	3rd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	Yamada Keisuke		

Course Objectives

At the completention of this course, students will be able to
1. give explanations of classification, working principle and heat cycle of internal combustion engine.
2. give explanations of definition of engine paformance evaluation, and calculate various efficiencies.
3. give explanations of ignition and combustion process of internal combustion engine.

Rubric

	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Evaluation 1	Give detailed explanations of classification, working principle and heat cycle of internal combustion engine	Give basic explanations of classification, working principle and heat cycle of internal combustion engine	Can't give basic explanations of classification, working principle and heat cycle of internal combustion engine
Evaluation 2	Give detailed explanations of definition of engine performance evaluation, and calculate various efficiencies	Give basic explanations of definition of engine performance evaluation, and calculate various efficiencies	Can't give basic explanations of definition of engine performance evaluation, and calculate various efficiencies
Evaluation 3	Give detailed explanations of ignition and combustion process of internal combustion engine	Give basic explanations of ignition and combustion process of internal combustion engine	Can't give basic explanations of ignition and combustion process of internal combustion engine

Assigned Department Objectives

MCCコア科目

Teaching Method

Outline	The aim of this course is to help students obtain basic knowledge of diesel engine for handling. This course deals with "output device" which is established as a part of the required subjects of training institution for ship officers. Main themes are as follows. ・Classification of internal combustion engine ・Heat cycle of internal combustion engine ・Engine performance evaluation ・Ignition and combustion process
Style	Lecture is conducted by one teacher.
Notice	・Results are evaluated in respect to the achievement targets by a combination of examination (75%, midterm and final exams) and report (25%). More than 60% is needed to earn the credit. ・If the score is lower than 60, student can make up the examination by application. When it is admitted to acquire the credit by make-up examination, the score is 60. ・Required subject (training institution of ship officer) for licensed mariner of 3rd grade (engine) 1. Output device (a) Working principle of diesel engine (b) Handling and maintenance of diesel engine (c) Failure detection and damage prevention of diesel engine

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 Classification of internal combustion engine	Explain the classification of internal combustion engine
		2nd	Working principle of diesel engine	Explain the working principle of diesel engine
		3rd	Thermodynamics of internal combustion engine	Explain the thermodynamics of internal combustion engine
		4th	Heat cycle of internal combustion engine	Explain the heat cycle of internal combustion engine
		5th	Performance of internal combustion engine 1. Indicated horsepower, effective horse power	Explain the Indicated horsepower and the effective horse power
		6th	2. Thermal efficiency, mechanical efficiency, heat balance chart	Explain the thermal efficiency, the mechanical efficiency and the heat balance chart
		7th	3. Volumetric efficiency, charging efficiency, excess-air ratio 4. Composition of exhaust gas	Explain the volumetric efficiency, the charging efficiency and the excess air ratio and composition of exhaust gas
		8th	Midterm examination	
	2nd Quarter	9th	5. Compression ratio 6. Fuel consumption, specific fuel consumption	Explain the compression ratio, the fuel consumption, and the specific fuel consumption
		10th	Combustion of diesel engine 1. Combustion form	Explain the Combustion form

		11th	2. Classification of combustion chamber configuration 3. Process of fuel injection	Explain the classification of combustion chamber configuration, and the process of fuel injection
		12th	4. Injection delay, ignition delay	Explain the injection delay and the ignition delay
		13th	5. Cause of abnormal combustion, effects on diesel engine	Explain the cause of abnormal combustion, and the effects on diesel engine
		14th	6. Indicator diagram, valve diagram	Explain the indicator diagram and the valve diagram
		15th	Final exam	
		16th	Return and explanation of final exam Class questionnaire	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Note, Report	Total
Subtotal	75	0	0	0	0	25	100
Basic Ability	0	0	0	0	0	0	0
Technical Ability	75	0	0	0	0	25	100
Interdisciplinary Ability	0	0	0	0	0	0	0