Hokkaido University Syllabus					
Course Title					
Combustion in Internal Combustion Engine					
Subtitle					
Instructor (Institution)					
Gen SHIBATA(Graduate School of Engineering)					
Other Instructors (Institution)					
Gen SHIBATA(Graduate School of Engineering)					
Course Type				Open To Other Faculties / Schools	NG
Year	2018	Semester	2nd Semester (Fall Term)	Course Number	093341
Type of Class	Lecture	Number of Credits	1	Year of Eligible Students	～
Eligible Department / Class				Other Information	
Numbering Code					
Major Category Code	Major Category Title				
Level Code	Level				
Middle Category Code	Middle Category Title				
Small Category Code	Small Category Title				
Language Type					
Classes are in Japanese and English (bilingual, or language is decided once the student composition has been finalized).					

Key Words

Fuel composition, Internal combustion engine, Combustion, Emissions, Homogeneous charge compression ignition, Energy

Course Objectives

Internal combustion (IC) engine is a main power source of automobiles in 21st century and the improvement of thermal efficiency is an important subject for the future energy and environment. The interactions between fuels and gasoline engine control, especially the fuel vaporization process, combustion and emissions, are the main topics of this class, and the next generation high performance engine, such as HCCI (Homogeneous Charge Compression Ignition) engine, is introduced. Further, the spread possibilities of EV, FCV and HEV vehicles on the market are discussed from the technical view points.

Course Goals

The understandings of:
1. Fuel/engine interactions on combustion, emissions and performance
2. Diversity of fuels and power sources of automobiles

Course Schedule

1. Fuel production at an oil refinery
・Fuel production processing from the crude oil
・Alternative fuels, such as bio fuels, shale oil and shale gas
2. The effects of fuel components on IC engines
・The measurements of IC engine control, fuel analysis and engine performance
3. Fuel vaporization process in gasoline engine
・The fuel vaporization in the intake port and fuel wall flow
・High speed in-cylinder gas sampling and analysis
4. Gasoline engine control
・Fuel injection control and ignition timing control against engine load and speed
5. High performance race engine and fuel combustion
・What is different between conventional and race fuels?
・High performance race fuels
6. The next generation high performance engine, the HCCI
・Two stage combustion: low and high temperature heat releases
・The technical barriers of HCCI
7. The spread possibility of EV, FCV and HEV

Homework

There is no text book in this course. The Power Point slides in the lecture will be provided in printed form as reference.
Every time, a small test/report is conducted after the class to evaluate the students' understandings (total 6 times).

Grading System

Reports in the class and the learning levels of the students

Textbooks

Reading List

Websites

Website of Laboratory

Additional Information

Update

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