Subjects and Key Words of the Entrance Examination for the International Master's Program in Mechanical Engineering and Hydrogen Energy Systems, Graduate School of Engineering, Kyushu University

(Examination: June, 2025　Entrance: October 1, 2025)

(Examination: January, 2026　Entrance: April 1, 2026)

Examination Subjects

(1) Engineering subjects

Department of Mechanical Engineering: Mechanics of Materials, Dynamics of Machinery, Thermal Engineering, Fluids Engineering

Department of Hydrogen Energy Systems: Take one of the following subject groups.

Group A: Mechanics of Materials, Dynamics of Machinery, Thermal Engineering, Fluids Engineering

Group B: Mechanics of Materials, “Mechanics and Materials Science”, “Physical Chemistry”, “Electrochemistry”

(2) Mathematics

(3) English

(4) Oral examination

Key Words

(1) Engineering subjects

Department of Mechanical Engineering and Department of Hydrogen Energy Systems - Group A

- Mechanics of Materials: Equilibrium Condition, Hooke's Law, Coordinate Transformation of Stress, Truss, Bending of Beam, Torsion, Thin Walled Pressurized Cylindrical Vessel, Buckling of Column
- Dynamics of Machinery: Dynamics of Point Mass, Dynamics of System of Particles, Dynamics of Rigid Body, Analytical Dynamics, Vibration of Single Degree-of-Freedom System, Vibration of Multiple Degree-of-Freedom System, Rotordynamics
- Thermal Engineering: The First Law of Thermodynamics in Closed and Open Systems, Change of State of Ideal Gas, Entropy and the Second Law of Thermodynamics, Gas Cycle, Liquid-Vapor Phase Change, Steam Power Cycle, Refrigeration Cycle, Heat Pump Cycle, Conductive Heat Transfer, Convective Heat Transfer, Radiative Heat Transfer, Heat Exchanger
- Fluids Engineering: Characteristics of Fluids, Fluid Statics, Fluid Kinematics, Continuity Equation, Momentum Equation, Angular Momentum Equation, Energy Equation, Pipe Flow and Losses, Dimensional Analysis and Similitude, Laminar Flow, Quasi-Steady Flow

Department of Hydrogen Energy Systems - Group B

- Mechanics of Materials: Equilibrium Condition, Hooke's Law, Coordinate Transformation of Stress, Truss, Bending of Beam, Torsion, Thin Walled Pressurized Cylindrical Vessel, Buckling of Column
- Mechanics: Newton's Laws of Motion, Motion of a Particle, Work and Energy, Relative Motion, Dynamics of Particles, Planer Motion of a Rigid Body
- Materials Science: Chemical Bond of Materials, Solid-State Structure of Materials, Crystal and Amorphous, Physical Properties of Materials, Process Technology of Materials, Energy Conversion Materials, Composite Materials
- Physical Chemistry: The Properties of Gases, Chemical Thermodynamics, Physical Transformations of Pure Substances, Simple Mixtures, Phase Diagrams, Chemical Equilibrium, Molecules in Motion, The Rates of Chemical Reactions
- Electrochemistry: Equilibrium Electrochemistry, Nernst Equation and Electromotive Force, Components of Electrochemical System, Reference Electrode and Standard Potentials, Electrochemical Kinetics, Faraday's Law (of Electrolysis), Charge Transfer Process, Mass Transfer Process, Fuel Cells and Water Electrolyzers

(2) Mathematics: Differential and Integral Calculus, Differential Equations, Linear Algebra, Vector Calculus, Numerical Analysis, Geometry, Complex Function, General Applied Mathematics