Subject	Earthquake Engineering and Mitigation of Earthquake Hazard
Theme	Introduction of advanced study on earthquake engineering toward practical problems in terms of recent seismic design, numerical methodology, mitigation of hazards.
Objective/aim	To present recent problems in earthquake engineering and solutions to them, based on theoretical, numerical and experimental research results etc.
Keywords	Earthquake, Vibration, Wave Propagation, Dynamics, Numerical Procedures, Seismic Design, Concrete, Nonlinearity, Damage, Soil-Structure Interaction, Bridges, Buildings, Retrofitting of Structures, Wooden Houses
Course content (outline)	This course deals with the topics associated with earthquake engineering as follows: 1) Introduction: Earthquake Damage to Wooden Houses in Japan; 2) Dynamic Response of Elastic Systems; 3) Ground Motion and Related Numerical Analysis; 4) Nonlinear Structural Response; 5) Earthquake Damage to Structures and Seismic Design for Structures
Course type	Condensed course
Outline	**No.1 : Introduction: Earthquake Damage to Wooden Houses in Japan** (Prof. Hideji KAWAKAMI, November 3-7, 75 mins x 5) 1) Damage to wooden houses due to past earthquakes 2) Earthquake damage simulation of wooden houses 3) Modeling of structures (vibration theory of mass-spring systems, formulation of equations of motion, single-degree-of-freedom systems, free and forced vibrations) 4) Modeling of earthquake ground motions (seismicity and source mechanism) **No.2: Dynamic Response of Elastic Systems (Multiple-Degree-of-Freedom Systems)** (Assoc. Prof. Masato SAITOH, November 10-18, 75 mins x 7) 1) Numerical evaluation of dynamic response to arbitrary waves (Part.1 explicit method) 2) Numerical evaluation of dynamic response to arbitrary waves (Part.2 explicit method) 3) Dynamic response of elastic systems subjected to earthquake waves (response spectrum)

	4) Modeling of MDoF Systems 5) Equation of motion of MDoF Systems (Soil-Structure systems) 6) Fundamental behavior of MDoF Systems subjected to earthquake waves **No.3: Ground Motion and Related Numerical Analysis** (Assoc. Prof. Hidenori MOGI, November 19-26, 75 mins x 7) 1) Fourier Analysis of Ground Motion 2) Wave Equation of SH-wave 3) Multiple Reflection Theory of SH-wave 4) Response Spectrum **No.4: Nonlinear Structural Response** (Assoc. Prof. Takeshi MAKI, December 1-5, 75 mins x 6) 1) Damaged RC Structures during Recent Earthquakes in Japan 2) Nonlinear Mechanical Behavior of Structural Materials 3) Nonlinear Response of RC Structures based on Experimental Evidences 4) Modeling for Nonlinear Response Evaluation of RC Structures 5) Numerical Method for Nonlinear Response of RC Structures 6) Nonlinear Response Spectrum for Seismic Resistant Design against Severe Earthquake **No. 5: Earthquake Damage to Structures and Seismic Design for Structures** (Prof. Hiroshi MUTSUYOSHI, December 9-11 (or 9-16 if possible), 75 mins x 5) 1) Recent earthquake damage to structures due to Kobe earthquake (1995) and Niigata-tyuetsu earthquake (2004). 2) Seismic design for highway bridges based on performance-based design method 3) Strengthening of damaged structures 4) Recent topics on earthquake engineering (E defense project: a largest shaking table in the world)
Grading	Reports (100%) The followings are minimum requirements: 1) Attending more than 2/3 of classes, 2) submitting all reports
Criterion for grading	Criterion for grading: A=100-80%, B=79-70%, C=69-60%, D<60% (Fail)