

1	Title	High-speed Gas Dynamics	
2	Lecturer, Units	Nobuyuki Tsuboi	2
3	Purpose	Recent rockets and space vehicles flight under subsonic, supersonic, and hypersonic flow environment. They also flight from continuum flow regime to rarefied gas flow regime. This course presents such the fundamental gas dynamics of the hypersonic flow and rarefied gas flow for the rockets and space vehicles.	
4	Lecture schedule	I . Introduction II . Hypersonic Fluid Dynamics (1)What is hypersonic flow? (2)Experimental approach (3)Various approximate solvers (4)Inviscid hypersonic flow (5)Viscous hypersonic flow (6)Real gas effect III. Rarefied Gas Dynamics (1)What is rarefied gas dynamics? (2)Microscopic feature of gas (3)Equilibrium gas state (4)Gas-surface interaction (5)Numerical Simulation of rarefied gas flow	
5	Evaluation	Attendance of class, reports, and end of semester examination.	
6	Note		
7	Textbook Reference	Text book: provide copy of slides References: (1)J.D.Andarson, Jr., Hypersonic and High Temperature Gas Dynamics, McGraw-Hill(1989) (2)Bird, G.A., Molecular Gas Dynamics and the Direct Simulation of Gas Flow, Oxford(1994)	