Course Category	TBA	Credits	2
Subject Code	TBA	Taking Year	1st Grade, 2nd Grade
Course Title (Japanese)	双曲型偏微分方程式論	Course Period	2nd Semester
Course Title	Hyperbolic Partial Differential Equations	Day of the week / Hour	Tuesday / The fourth period
Registration Code	TBA	Compulsory / Elective	Elective
Instructor(s)	Takeshi Wada	Course Qualification	Students of Postgraduate Mathematics Course

Course Style	Lecture
Course Aim	We give an introduction to basic theory of parabolic partial differential equations. We mainly focus on the linear and nonlinear heat and Navier-Stokes equations, and study basic properties of hyperbolic equations.
Goals and Objectives (Level of Achievement)	We aim at giving an introduction to the basic method for the study of hyperbolic equations such as Fourier analysis and distributions, and to the basic properties of hyperbolic equations such as finite propagation speed, local energy decay and Strichartz estimates. We also give an introduction to the analysis of nonlinear wave equations.
Course Plan	1. Fourier transform (1) 2. Fourier transform (2) 3. Tempered distributions (1) 4. Tempered distributions (2) 5. Kirchhoff's formula 6. Characteristics, phenomenon of finite propagation speed 7. Method of stationary phase 8. Energy inequality 9. Solutions in exterior domains 10. Local energy decay 11. Strichartz's inequalities 12. Cauchy problem for nonlinear wave equations (1) 13. Cauchy problem for nonlinear wave equations (2) 14. Blow up and estimates of life span for nonlinear wave equations 15. Null forms 16. Examination
Teaching Methods	Homeworks will be given during the course.
Key Words	Fourier transforms, Distributions, Wave equations, Finite propagation, Local energy decay, Strichartz inequality
Texts	[1] G.. B. Folland, Introduction to Partial Differential Equations, Princeton Univ. Press. [2] C. Sogge, Lectures on Nonlinear Wave Equations, International Press.
Reference Books	Further references and materials will be given in class.
Other Teaching Materials	Further references and materials will be given in class.
Performance Evaluation	Evaluation is based up on final exam and class attendance. It is strongly recommended to study the homeworks.
Notes on the Course	It is desirable that the students taking this class have learned Lebesgue integral.
Office Hour	Tuesday, 10h15 –11h45
Other Notes	None