Course Category	TBA	Credits	2
Subject Code	TBA	Taking Year	1st Grade, 2nd Grade
Course Title (Japanese)	放物型偏微分方程式論	Course Period	2nd Semester
Course Title	Parabolic 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 parabolic equations.
Goals and Objectives (Level of Achievement)	We aim at giving an introduction to the basic method for the study of parabolic equations such as Fourier analysis and analytic semigroups, and the basic properties of parabolic equations such as smoothing property. We also give an introduction to the analysis of nonlinear heat equations and Navier-Stokes equations.
Course Plan	1. Fourier transforms, the heat kernel 2. Eigenvalue problems of Elliptic operators (1) 3. Eigenvalue problems of Elliptic operators (2) 4. Maximum principle (1) 5. Maximum principle (2) 6. Smoothing properties of heat equations 7. Decay estimates of solutions 8. Analytic semigroups (1) 9. Analytic semigroups (2) 10. Construction of solutions to parabolic equations via semigroup theory 11. Nonlinear heat equations (1) 12. Nonlinear heat equations (2) 13. Global existence and finite time blow up 14. Navier-Stokes equations (1) 15. Navier-Stokes equations (2) 16. Examination
Teaching Methods	Homeworks will be given during the course.
Key Words	Fourier transforms, Heat equations, Smoothing property, Analytic semigroups, Navier-Stokes equations
Texts	[1] G. B. Folland, Introduction to Partial Differential Equations, Princeton Univ. Press. [2] C. Evans, Partial Differential Equations, AMS. [3] H. Brezis, Functional Analysis, Sobolev Spaces and Partial Differential Equations, Springer.
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