School of Mathematics

Course 415 - Topics in Analysis (harmonic analysis)  
(JS & SS Mathematics )  
2005-06

Lecturer: Dr. Hyung Ju Hwang

Requirements/prerequisites:

Duration: 21 weeks

Number of lectures per week: 3

Assessment:  
Homework: 20%, Presentation: 30%, Paper: 50%

End-of-year Examination: One 3-hour examination in May/June.

Description:

**Fourier Series:** Basic properties, Convergence, Applications

**Fourier Transform on \( \mathbb{R} \):** Basic properties, Applications to heat equations, Heat and Poisson kernels

**Fourier Transform on \( \mathbb{R}^d \):** Basic properties, Applications to wave equations, Radon transform

**ODE models in Biology:** Linear stability, Population dynamics, Molecular events, Limit cycles, Oscillations, Excitable systems

**PDE and Diffusion in Biology:** Convection, Diffusion, Attraction

**PDE models in Biology:** Population model, Steady states, Traveling waves, Transport model, Do-It-Yourself model

**Pattern formation in Biology:** Aggregation, Diffusive instability, Morphogenesis

**Survey paper & Presentation:** Article survey project (perhaps in collaboration with another student) which arises during the second semester. At the end of the course each team will be expected to give a short presentation on their research and write a survey paper on it. Submission of a survey paper is due on May, 1, 2006, Monday.

Textbooks:


References:


October 11, 2005