Course Outline
Accelerator Physics

Meeting Times: Tuesdays and Thursdays, 16:20-17:35, CAS 0117 (Accelerator Center Conference Room, 1027 W 47th St.)
Text: H. Wiedemann, *Particle Accelerator Physics,* 3rd Edition, Springer
Supplementary Texts: K. Wille, *The Physics of Particle Accelerators,* Cambridge University Press, A. W. Chao and M. Tigner, *Handbook of Accelerator Physics and Engineering,* J. D. Jackson, *Classical Electrodynamics*
Grading: Homework Problems 35%; Mid-term Examination 25%; Final Examination 40%
Office Hours: 12:00-16:00 Thursdays, CAS 107

Course Content

- Advanced Linear Dynamics
    - Solenoids
    - Coupled Motion
    - Flat Beam Transformations
    - 4 by 4 Matrix Descriptions
- Linear and Non-linear Perturbations
    - Multipoles
    - Closed Orbit Distortion and Correction
    - Resonances and Resonance Theory
    - Chromaticity and Its Correction
    - Lyapunov Exponents
    - Chaotic Dynamics
- Charged Particle Acceleration
    - RF Acceleration Systems
    - Acceleration System Parameters
    - Beam Loading
    - Robinson Damping
- Statistical and Collective Effects
    - Vlasov Theory
    - Landau Damping
    - Envelope Theory
    - Beam-beam Effect
    - Basic Instabilities

- Relaxation Phenomena
    - Intrabeam Scattering and Toushek Effect
    - Beam Cooling Methods and Theory
    - Radiation Damping and Low Emittance Rings