University of Wisconsin - Madison  
College of Engineering [EGR]  
Last Offered: 2011-2012 Spring [1124]  
Direct Link to this Syllabus:  

1. **E C E 561, Introduction to Charged Particle Accelerators**  
2. **Credits:** 3  
   **Contact Hours:** 3.0  
3. **Textbook and Materials:**  
   a. **Other Supplemental Materials:** None

• **Specific Course Information:**  
  
a. **Brief description of the content of the course (Course Catalog Description):** Charged particle accelerators and transport systems, behavior of particles in magnetic fields, orbit theory, stability criteria, acceleration theory. Applications to different types of accelerators.
  
b. **Pre-requisites or Co-requisites:** Math 322, EMA 202 or Phys 311, Phys 322 or cons inst
  
c. **This is a Selected Elective course.**

• **Specific Goals for the Course:**  
  
a. **Course Outcomes:**  
   
1. This course is designed to give students an understanding of charged particle acceleration techniques, orbit dynamics, storage rings, synchrotrons, phase space damping, and applications to inertial fusion and synchrotron radiation sources.

• **ABET Student Learning Outcomes:**  
  
(a) Ability to apply mathematics, science and engineering principles.  
(e) Ability to identify, formulate and solve engineering problems.  
(k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
• **Brief List of Topics to be Covered:**
  1. Brief history of accelerators
  2. Classical dynamics applied to orbit theory
  3. Examples of accelerators
  4. Synchrotrons
  5. Orbit theory calculations
  6. Storage rings and phase space cooling
  7. Application of principles to inertial fusion and synchrotron radiation sources
  8. Calculations of the energetics of inertial fusion and synchrotron radiation sources