University of Wisconsin - Madison  
College of Engineering [EGR]  
Last Offered: 2015-2016 Spring [1164]  
Direct Link to this Syllabus:  
http://aefis.wisc.edu/index.cfm/page/CourseAdmin.ViewABET?coursecatalogid=122&pdf=True  

1. **E C E 525, Introduction to Plasmas**  
2. **Credits**: 3  
   **Contact Hours**: 2.5  
3. **Textbook and Materials**: Introduction to Plasma Physics and Controlled Fusion; Chen; 2; 1984  

   a. **Other Supplemental Materials**: None  

   • **Specific Course Information**:  

   a. **Brief description of the content of the course (Course Catalog Description)**: Basic description of plasmas: collective phenomena and sheaths, collisional processes, single particle motions, fluid models, equilibria, waves, electromagnetic properties, instabilities, and introduction to kinetic theory and nonlinear processes. Examples from fusion, astrophysical and materials processing plasmas.  

   b. **Pre-requisites or Co-requisites**: One crse in electromagnetic fields beyond elem physics  

   c. **This is a Selected Elective course**.  

   • **Specific Goals for the Course**:  

   a. **Course Outcomes**:  

      2. Work on laboratory research projects.  
      3. Understand a significant fraction of material presented at the weekly plasma seminar.  
      4. Take more advanced plasma courses.  
      5. Assess career opportunities in plasma-related areas.
• **ABET Student Learning Outcomes**:

(a) Ability to apply mathematics, science and engineering principles.  
(e) Ability to identify, formulate and solve engineering problems.  
(g) Ability to communicate effectively.  
(k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

• **Brief List of Topics to be Covered**:

Basic description of a plasma; occurrence in nature and laboratory

Single particle motion

Fluid equations applied to plasmas

Waves in plasma

Collisional processes, diffusion and resistivity

Equilibrium and stability

Introduction to kinetic theory

Nonlinear effects

Application to controlled fusion