

**UNIVERSITY OF MICHIGAN  
DEPARTMENT OF MECHANICAL ENGINEERING**

**Prof. J. L. Stein**

**ME560**

**Winter 2004**

<name = schedule.ps>  
**MODELING DYNAMIC SYSTEMS  
Reading Assignments - Tentative**

**Readings**

First Week

- Introduction
- Definitions
- Physical Modeling

Chapter 1  
Chapter 2

Second and Third Week

- Bond Graphs
- Basic 1, 2 and 3 ports
- Sources
- Junction Structures
- Bond graphs for Control Systems
- Active Bonds, Block Diagrams
- Causality

Chapter 3  
  
Chapter 8.3  
Chapter 8.4

Fourth and Fifth Week

- Mechanical Systems
- Electrical & Electromechanical Systems
- Hydraulic Systems

Chapter 4

Sixth and Seventh Week

- Causality and State Equation Formulation
- Computer Simulation

Chapter 5  
Chapter 13

Eight and Ninth Week

- Time Response Of Linear Systems
- Laplace Transforms
- Eigenvalues and Eigenvectors

Chapter 5\*  
Chapter 6

Ninth and Tenth Week

- Linearization
- Proper Models
- Model Order Reduction
- Model Order Deduction

Course Notes  
Course Notes  
Course Notes  
Course Notes

Eleventh and Twelfth Week

- Component Mode Synthesis
- Distributed Parameter Systems: Modal vs. discretized continuous systems
- Finding the Best Model: Emoda

Course Notes  
Chapter 10  
Course Notes

Thirteenth and Fourteenth Week

- Advanced topics

\* Introducing Systems and Control Takahashi, Rabins and Auslander, Addison-Wesley, 1972.  
Many, many other text books are available on this linear systems topic. Some examples are:  
Linear Systems, P. J. Antsaklis and A. N. Michel, McGraw-Hill, 1997.  
Linear System Theory and Design, 2nd edition, C.-T. Chen, Holt, Rinehart and Winston, 1984.

**Final Exam as per UofM Final Exam Schedule.**