

ECE 673 / SYST 620 Discrete Event Systems (3.0:3)
Prerequisites: ECE 521 or SYST 611 or equivalent

Introduction to modeling and analysis of discrete event dynamical systems. Course covers elements of discrete mathematics and then focuses on Petri Net models and their basic properties: locality and concurrency. Condition/event systems; Place/transition nets; Colored Petri nets; Reachability graphs (Occurrence nets); and Invariant Analysis. Temporal issues in Petri nets and Temporal Logic. Stochastic Petri nets. Relation to other discrete event models of dynamical systems. Applications of the theory to modeling and simulation and to systems engineering problems

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Course Call numbers: ECE 673 001 72896; SYST 620 001 72872; SYST 620 618 77595

Fall 2007: T 4:30 – 7:10 pm in Room IN 132 (Innovation Hall)

COURSE OUTLINE (subject to change)

- 8/28/2007 1. Introduction: Systems and Models; Graph Theory; Petri Net basics
- 9/4/2007 2. Set Theory; Essential Features of Petri Nets; CPN Tools I
- 9/11/2007 3. Symbolic Logic; Petri Net models and Definitions
- 9/18/2007 4. Predicate Logic; Colored Petri Nets; CPN Tools II
- 9/25/2007 5. Functions and Relations; Formal definition of CP Nets; PN properties
- 10/2/2007 6. ML Programming
- 10/16/2007 Mid Term
- 10/23/2007 7. Petri Nets and Time; Hierarchical Petri Nets
- 10/30/2007 8. Petri Net Properties: Structural Methods and Invariants
- 11/6/2007 9. State Space methods; State Space analysis in CPN
- 11/13/2007 10. Stochastic Petri Nets; Simulation based analysis using CPN
- 11/20/2007 11. Other DEDS models: Languages and Finite State Machines
- 11/27/2007 12. Petri Net applications: V&V of rule bases, Adaptive architectures
- 12/4/2007 13. Engineering Applications of Petri Nets
- 12/11/2007 Final Exam

Reading and reference material:

Kurt Jensen and Lars Kristensen, *Coloured Petri Nets*, Springer, Berlin (to be published in 08)
Class notes by A. H. Levis and A. K. Zaidi
Other references posted on WebCT

Student Evaluation Criteria: Homework 40%; Midterm 25%; Final 35%