

ECE 605-101: Discrete Event Dynamic Systems

Prerequisites: Senior Student/Graduate Student in ECE

Description: This course introduces fundamentals and advanced concepts of discrete event systems: logical models, timed models, stochastic timed models, graphical representations, Markov chains, and discrete-event simulation. The primary mathematical and graphical model is Petri nets. It presents their applications in modeling, control, analysis, validation, simulation, and performance evaluation of computer systems, hardware/software co-design, embedded control, IC manufacturing and assembly, robotic systems, intelligent control, workflow management, supply chain, transportation, semiconductor manufacturing, communication networks, and biological systems.

Course learning outcomes: Students should be able to model, analyze, design, synthesize, improve and implement discrete event systems.

Outline:

Topic	Week
State machines and graph theory	1
Hardware implementation	2
Petri nets, reachability tree, properties	3-5
Modeling methodologies	6
Deterministic time Petri nets, Midterm Exam	7-8
Markov chains	9-10
Stochastic Petri nets	11
Discrete-event simulation tool	12
Complex system modeling and analysis	13
Project presentation	14

Instructor: MengChu Zhou, 347 ECEC, (973) 596-6282, email: zhou@njit.edu

Office hours: Thursday 5-6pm or by appointment

Web page: <http://web.njit.edu/~zhou>

Classroom: CKB 220 **Instruction time:** 6-9pm, Thursday

Textbook: Hruz, B. and M. C. Zhou, *Modeling and Control of Discrete Event Dynamic Systems*, Springer, London, UK, 2007 (Advanced Textbooks in Control and Signal Processing). ISBN-13: 9781 8462 88722

Reference book: M. C. Zhou and K. Venkatesh, *Modeling, Simulation and Control of Flexible Manufacturing Systems: A Petri Net Approach*. World Scientific, 1998. ISBN 981-02-3029-X.

Grading: Midterm @ 40%; Final exam @ 30%; 4 homeworks and class participation @ 30% total. Homework will be posted to the class's email list at least one week prior to their due dates. No points will be given to your homework submission if it passes its deadline.

Modifications: Students will be consulted prior to any modification to this syllabus and must agree to any modifications or deviations throughout the course of the semester. Listed test dates are tentative and subject to change. Students unable to submit homework assignments or take tests due to religious observances or other reasons should contact the instructor as soon as possible to make alternate arrangements for the missed assignments.

Academic Integrity policy: All students are expected to follow the NJIT Honor Code in this course. This includes pledging all homework assignments and exams.