

NEW JERSEY INSTITUTE OF TECHNOLOGY
MASS TRANSPORTATION SYSTEMS (TRAN 705)

FALL 2016

Instructor: Dr. Steven Chien
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Office hours: Monday 4:00 p.m. ~ 6:00 p.m. or by appointment

Lecture hours: Monday 6:00 p.m. ~ 9:05 p.m., Room: TBD

Grading: Homework 25%
Midterm Exam 35%
Term Project 40%

Course Description

The course provides the basic introduction to the field of mass transportation systems planning and analysis. Approaches provided in this course will be applicable to many different mass transportation systems problems. The approaches will incorporate concepts from economics, engineering, operations research, and public policy analysis. Enough numerical examples will be provided to build understanding of the concepts and to indicate how they can be applied in practice to various modes and problems.

Textbook

Vukan R. Vuchic, Urban Transit Operations, Planning, and Economics, John Wiley & Sons, Inc., 2005

Reference Papers:

1. Steven Chien and Paul Schonfeld, "Optimization of Urban Grid Transit System in Heterogeneous Urban Environmental," *J. of Transp. Engrg., ASCE*, Vol. 123, No. 1, pp. 28~35, Jan/Feb 1997.
2. Steven Chien and Paul Schonfeld, "Joint Optimization of a Rail Transit Line and its Feeder Bus System," *J. of Advanced Transp.*, Vol. 32, No. 3, pp. 253-284, Fall/Winter 1998.
3. Steven Chien, Shoarb Chowdhury, Kyriacos Mouskos, and Yuqing Ding, "Enhancements of the CORSIM Model in Simulating Transit Vehicle Operations," *J. of Transp. Engrg., ASCE*, Vol. 126, No. 5, pp 396~404, Sep/Oct 2000.
4. Steven Chien and Zhaowei Yang, "Optimal Feeder Bus Routes with Irregular Street Networks," *J. of Advanced Transp.*, Vol. 34, No. 2, pp 213~248, Summer 2000.
5. Steven Chien, Yuqing Ding, and Noreen Zayas, "Microscopic Simulation of Bus Transit Operations - Bus Rt. #39 of New Jersey Transit," TRR No. 1731, pp. 104 ~ 111, 2001.
6. Steven Chien, Lazar Spasovic, Renu Chhonkar, and Spyridon Elefsiniotis, "Evaluation of Feeder Bus Systems with Probabilistic Time-Varying Demands and Non-Additive Time Costs," TRR No. 1760, pp. 47~55, 2002.
7. Yuqing Ding and Steven Chien, "Improving Transit Service Quality and Headway Regularity with Real-Time Control," TRR No. 1760, pp 161 ~ 170, December 2001.
8. Steven Chien, Yuqing Ding, and Chien-hung Wei, "Dynamic Bus Arrival Time Prediction using Artificial Neural Networks," *J. of Transp. Engrg., ASCE*, Vol. 128, No. 5, pp 429~438, September/October 2002.
9. Steven Chien and Lazar Spasovic, "Optimization of Grid Bus Transit Systems with Elastic Demand," *J. of Advanced Transp.*, Vol. 36, No. 1, pp 63~91, September 2002.
10. Steven Chien and Shoab Chowdhury, "Intermodal Transit System Coordination," *J. of Transp. Planning and Technology*, Vol. 25, No. 4, pp 257~288, December, 2002.
11. Rajat Rajbhandari, Steven Chien, and Janice Daniel, "Development of Statistic Models for Estimating Bus Dwell Times with AVL/APC Data," TRR, 2003.
12. Mei Chen, Jason Yaw, Steven Chien, and Xiaobo Liu, "Using AVL/APC Data in Bus Arrival Time Prediction," *J. of Advanced Transp.*, January 2004.
13. Steven Chien, "Optimization of Headway, Vehicle Size, and Route Choice for Minimum Cost Feeder Service," *Journal of Transportation Planning and Technology*, Vol. 28, No. 5, pp. 359~380, 2005.
14. Steven Chien and Feng-Ming Tsai, "Optimization of Fare Structure and Service Frequency for Maximum Profitability of Transit System," *Journal of Transportation Planning and Technology*, Vol. 30, No. 5, pp 477~500, October 2007.
15. Steven Chien, Sunil Kumar Daripally, and Kitae Kim, "Development of a Probabilistic Model to Disseminate Bus Arrival Times," *Journal of Advanced Transportation*, Vol. 41, No. 2, pp 477~500, Spring 2007.
16. Steven Chien, Yavuz Ulusoy, and Chien-Hung Wei, "Integrated Transit Services for Minimum Cost Operation Considering Heterogeneous Demand," *Transportation Planning and Technology*, Vol. 33, No. 7, pp 605~624, Septembert 2010.
17. Steven Chien, Jongho Byun, and Athanassios Bladikas, "Optimal Stop Spacing and Headway of Congested Transit System Considering Realistic Wait Time," *Transportation Planning and Technology*, Vol. 33, No. 6, pp 495~513, June 2010.
18. Patricia DiJoseph and Steven Chien, "Optimizing Sustainable Feeder Bus Operation Considering Realistic Networks and Heterogeneous Demand," *Journal of Advanced Transportation*, Vol. 47, No. 5, pp 483~497, August 2013.
19. Lihui Zhao and Steven Chien, "Optimizing Stop Spacing and Headway for a Feeder Bus Route Considering Stochastic Vehicle Arrivals," *Journal of Advanced Transportation*, Article first published online: DOI: 10.1002/atr.1270, April 2014.

TENTATIVE SCHEDULE OF CLASSES

DATE	TOPIC	READING
9/12	Introduction	Class Notes
	Research Topics in Mass Transportation Systems	Class Notes
9/19	Intelligent and Smart Systems	Class Notes
	Mass Transportation Problems in Probabilistic Theory	Class Notes
9/26	Travel Time, Delay, and Reliability	Ref. 11, 17, Ch. 1, 2
	Vehicle and Passenger Arrival Distributions	Ref. 7, 15,
10/3	Mass Transportation Systems Costs	Class Notes
	Modeling Mass Transportation Problems	Ref. 1, 13, 16, 18
10/10	Term Project Discussion	
10/17	Mass Transportation Problems in Queuing Theory	Class Notes
	Systems Analysis and Evaluation	Ref. 17, Ch. 3
10/24	System Optimization & Algorithms	Ref. 14, 19
	Location Problems – Transit Stations	Ch. 5
10/31	Forecasting and Analysis	Ref. 9, 12, Ch. 11
	System Equilibrium	Class Notes
11/7	Midterm Exam	
11/14	Characteristics of Dynamic Systems	Ref. 8
	Application of Micro Simulation Models	Ref. 3, 5, Ch. 3
11/21	Operational Control in Mass Transportation Systems	Ch. 4
	Schedule and Headway Control	Ref. 7
11/28	Para-transit Systems	Ref. 6
	Routing & Scheduling Problems	Ref. 2, 4, 19, Ch. 2
12/5	System Integration and Coordination	Ch. 4
	Intermodal Transit Networks – Timed Transfer	Ref. 10
12/12	Term Project Presentation	
12/16	Term Project Due	