

Sharif University of Technology
Graduate School of Management and Economics
System Dynamics 2
Spring 2008
Professor Ali N. Mashayekhi

General Information
(subject to change)

Prerequisites	System Dynamics I						
Schedule	Class meets on Sundays and Tuesdays at 3:00-4:30						
Instructor	Ali N. Mashayekhi mashayek@sharif.edu						
Teaching assistant	Keyvan Vakili, Soheil Ghile, Mohmmad Akbarpour						
Web Site	To be announced						
Email	To be announced						
Course Objectives:	The objective of this course is to enhance the modeling capabilities of the students. The students who take this course would develop their capability to define a dynamic problem and develop a model to analyze and design policy.						
Course description	In this course we cover the following topics: System thinking and system perspective, modeling as a learning process, dynamic problem definition, dynamic hypothesis, model conceptualization, model formulation, parameter values, model analysis, sensitivity analysis and policy design, and model validation.						
Readings	Readings will be a different papers and book chapters as indicated in the course schedule bellow. All students are expected to read the readings and be ready to discuss them in the class						
Term projects	The class will be divided into different groups of 2 to 3 students. Each team will present an update of its project and hand in presentation slides according to a schedule that will be announced in the class.						
Grading	<table style="width: 100%; border: none;"> <tr> <td style="width: 70%;">Project</td> <td style="text-align: right;">50%</td> </tr> <tr> <td>Class participation</td> <td style="text-align: right;">25%</td> </tr> <tr> <td>Final presentation</td> <td style="text-align: right;">25%</td> </tr> </table>	Project	50%	Class participation	25%	Final presentation	25%
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No.	Date	Area	Readings / Assignments	Due
1	Tuesday 86/11/16	Introduction	Course schedule	
2	Sunday 86/11/21		Discussion on Term projects	
3	Tuesday 86/11/23	System perspective	System thinking critical skills for the 1990s and beyond, Barry Richmond, System Dynamics Review Volume 9, Summer 1993. Varieties of system thinking: the case of soft systems methodology, Peter B. Checkland and Michael G. Haynes, System Dynamics Review Volume 10 Numbers 2-3 Summer-Fall 1994	
4	Sunday 86/11/28	Foundation / Term projects	System dynamics, system thinking, and soft OR, Jay W. Forrester, System Dynamics Review Volume 10 Numbers 2-3 Summer-Fall 1994 System thinking/ system dynamics: Systems thinking/ system dynamics: let's just get on with it, Barry Richmond, System Dynamics Review Volume 10 Numbers 2-3 Summer-Fall 1994	
5	Tuesday 86/11/30	Foundation / Term Projects	System Dynamics and the Lesson of 35 Years, Jay W. Forrester, MIT working paper 1991. Homer Jack, Oliva Rogelio, Maps and models in system dynamics: a response to Coyle, SDR, 2001.	
6	Sunday 86/12/5	Modeling process	John Sterman, System Dynamics Modeling: Tools for Learning in A Complex World, California Management Review, Vol. 43 No. 4, Summer 2001. Jay W. Forrester, The Model versus a modeling process, Sys Dynamics Review, 1985.	First literature review for the term project
7	Tuesday 86/12/7	Dynamic problem definition	Guidelines for kickoff meeting and first breakout Group presentation: Definition of Concern and Momentum Policies, A course	

			<p>Hand Out, Jim Hines, MIT, 2001</p> <p>Guidelines for second client meeting(s) and presentation. Momentum Policies and Rough Dynamic Hypotheses, Jim Hines Course Handout</p>	
8	Sunday 86/12/12	Modeling process	<p>Group model-building: tackling messy problems, Jac A. M. Vennix, SDR Vol 15 No. 4, Winter 1999.</p> <p>Gloucester Fishery: insights from a group modeling intervention, Peter Otto and Jeroen Struben, System Dynamics Review Vol 40, 2004</p>	First draft of problem definition
9	Tuesday 86/12/14	Dynamic hypothesis	<p>Khalid Saeed, Articulating developmental problems for Simulation based policy design: An illustration addressing food security in Asia, SDR 2004.</p> <p>Guidelines for third Breakout Group presentation: Dynamic Hypotheses, Jim Hines Course Handout</p>	
10	Sunday 86/12/19	Model conceptualization	<p>Problems in causal loop diagrams revisited, George P. Richardson, SDR Vol. 13, No. 3, 1997.</p> <p>Jay W. Forrester, Policies, decisions and information sources for modeling, European Journal of Operational Research 59 (1992).</p>	
11	Tuesday 86/12/21	Model conceptualization	<p>Homer Jack B., Macro- and micro-modeling of field service dynamics, SDR, 1999.</p> <p>Guidelines for fourth presentation: Mini Presentation, Jim Hines Course Handout</p>	
12	Sunday 86/12/26	Model conceptualization	<p>Kim Warren, The Dynamics of Strategy, Business Strategy Review, 1999, Volume 10 Issue 3, pp 1-16</p> <p>Jac A. M. Vennix, Group model-building: tackling messy problems, SDR Vol 15, No. 4, 1999.</p>	Final Draft of Problem definition, literature review, and dynamic hypothesis

13	Tuesday 86/12/28	model formulation	<p>Jim Hines, Guidelines for fifth project week and group presentation: Partial model of first hypothesis, course hand out, 2001.</p> <p>Jim Hines, The “Standard Method, course handout, 2001.</p>	
14	Sunday 87/1/18	model formulation	<p>David N. Forda and John D. Sterman, Expert knowledge elicitation to improve formal and mental models, SDR, Vol. 14, No. 4, (Winter 1998)</p> <p>John Morecraft, Rationality in the analysis of behavioral simulation models, Management Science Vol. 31, No. 7, 1985.</p>	First draft of model conceptualization
15	Tuesday 87/1/20	model analysis	<p>Jim Hines, Guidelines for sixth project week and presentation: Model and analysis of first hypothesis, course handout, 2001.</p> <p>Mashayekhi Ali N., Public finance, oil revenue expenditure and economic performance: a comparative study of four countries, System Dynamics Review 1998.</p>	
16	Sunday 87/1/25	Projects presentation	<p>Lyneis James M., System dynamics for business strategy: a phased approach, SDR, 1999.</p> <p>Lyneis James M., Cooper Kenneth G., Els Sharon A., Strategic management of complex projects: a case study using system dynamics, SDR, 2001.</p>	
17	Tuesday 87/1/27	Projects presentation	James M. Lyneis, System dynamics for market forecasting and structural analysis, SDR, 2000.	
18	Sunday 87/2/1	Projects presentation	Ali Naghi Mashayekhi, The impact of exchange rate policy on inflation rate in an oil-exporting economy, SDR, 1991.	Second draft of model conceptualization and initial formulation
19	Tuesday	policy design	Jim Hines, Guidelines for final presentation,	

	87/2/3		course handout, 2001. Jack B. Homer, Worker burnout: a dynamic model with implications for prevention and control, SDR, 1985.	
20	Sunday 87/2/8	Projects presentation	S. Friedman: Counter-productive policy in highway maintenance: Is counter productive policy creating serious consequences? The case of highway maintenance	First Behavior analysis
21	Tuesday 87/2/10	model validation	Sterman John, Truth and Beauty: Validation and Model Testing, Business Dynamics Chapter 21, Mc Graw Hill 2000 Kampmann Christian, Replication and revision of a classic system dynamics model: critique of “population Control Mechanisms in a Primitive Agricultural Socceity” SDR Vol. 7, No. 2 1991	
22	Sunday 87/2/15	model validation	Yaman Barlas and Stanley Carpenter, Philosophical roots of model validation: two paradigms, SDR Vol. 6 No. 2. 1990. Yaman Barlas, Formal aspects of model validity and validation in system dynamics, SDR Vol. 12, no. 3, 1996	Model testing report
23	Tuesday 87/2/17	model validation	Morecraft John, Strategic Modeling and Business Dynamics, Chapter 10: Model validity, mental models and learning, John Wiley, 2007.	
24	Sunday 87/2/22	Projects presentation	James M. Lyneis and David N. Ford, System dynamics applied to project management: a survey, assessment, and directions for future research, SDR 2007.	Policy analysis
25	Tuesday 87/2/24	Projects presentation	Homer Jack B., A system dynamics model of national cocaine prevalence, SDR, 1993.	
26	Sunday 87/2/29	Projects presentation	Homer Jack B., Gary Hirsch, and Bobby Milstein, Chronic illness in a complex health economy: the perils and promises of downstream and upstream reforms, SDR, 2007.	Sensitivity analysis

27	Tuesday 87/2/31	Projects presentation	David F. Andersen and George P. Richardson, Scripts for group model building, System Dynamics Review Vol. 13, No. 2, 1997.	
28	Sunday 87/3/5	Projects presentation	Robert Y. Cavana and Leslie V. Clifford, Demonstrating the utility of system dynamics for public policy analysis in New Zealand: the case of excise tax policy on tobacco, SDR, 2006.	First draft of the project report
29	Tuesday 87/3/7	Projects presentation	Paulo Gonçalves, Jim Hines and John Sterman, The impact of endogenous demand on push-pull production systems, SDR, 2005.	
30	Sunday 87/3/12	Course conclusions		Final term project report