

Guided Study Program in System Dynamics

System Dynamics in Education Project

System Dynamics Group

MIT Sloan School of Management

Tentative Course Syllabus

Last Updated: September 20, 1998

Ass. #	Out	Due	Duration	Contents
1	9/11	9/21	1 week	<i>Systems 1: An Introduction to Systems Thinking</i> System Dynamics and Learner-Centered Learning in Kindergarten through 12th Grade Education (D-4337) <i>Principles of Systems</i> : Chapter 1
2	9/18	9/28	1 week	Simulating Hamlet in the Classroom (D-4540-1) System Dynamics Meets the Press, an excerpt from <i>The Global Citizen</i> (D-4143-1) Counterintuitive Behavior of Social Systems (D-4468-1)
3	9/25	10/5	1 week	Vensim PLE User's Guide, Sections 2 and 6 The First Step (D-4694) Beginner Modeling Exercises (D-4347-6) Modeling Exercise: Saplings
4	10/2	10/12	1 week	An Introduction to Feedback (D-4691) Graphical Integration Exercises Part One: Exogenous Rates (D-4547-1) <i>Study Notes in System Dynamics</i> , Chapter 2, Sections 3.1-3.9
5	10/9	10/19	1 week	Beginner Modeling Exercises Section 2: Mental Simulation of Positive Feedback (D-4487) Beginner Modeling Exercises Section 3: Mental Simulation of Negative Feedback (D-4536) Graphical Integration Exercises Part Two: Ramp Functions (D-4571) <i>Principles of Systems</i> , Sections 2.1, 2.2, 2.4

6	10/16	10/26	1 week	<i>Introduction to Computer Simulation</i> , Chapter 15 Mistakes and Misunderstandings: Examining Dimensional Inconsistency (D-4452-1) <i>Study Notes in System Dynamics</i> , Exercises 6, 7, Sections 3.10-3.11 Modeling Exercise: Demographics
7	10/23	11/2	1 week	Market Growth as Influenced by Capital Investment, from <i>Collected Papers of Jay W. Forrester</i> Vensim PLE User's Guide Section 7: Building Functions with Lookups <i>Study Notes in System Dynamics</i> , Section 3.12 Modeling Exercise: CFCs
8	10/30	11/9	1 week	Generic Structures: First Order Linear Positive Feedback (D-4474-1) Generic Structures: First Order Linear Negative Feedback (D-4475-1) Mistakes and Misunderstandings: Time Constants Modeling Exercise: TBA
9	11/6	11/16	1 week	Beginner Modeling Exercises Section 4: Mental Simulation: Adding Constant Flows (D-4546) Graphical Integration Exercises Part Three: Combining Flows (D-4596) Computation Sequence Modeling Exercise: TBA
10	11/13	11/23	1 weeks	Problems with Causal Loop Diagrams (D-3312-1) <i>Study Notes in System Dynamics</i> , Chapters 4 and 5 Beginner Modeling Exercises Section 5: Mental Simulation of Combining Feedback in First-Order Systems (D-4593-1) Mistakes and Misunderstandings: Time Constants and Decay Fractions (D-4679)
11	11/20	12/7	2 weeks ¹	<i>Introduction to Computer Simulation</i> , Chapter 16 Modeling Exercise: Urban Dynamics <i>World Dynamics</i> , Chapters 1, 2, 4
12	12/4	12/14	1 week	Generic Structures: S-shaped Growth I (D-4432) <i>Principles of Systems</i> , Chapter 3 Graphical Integration Exercises Part Four: Reverse Graphical Integration (D-4603) Modeling Exercise: Internet
13	12/11	1/11	4 weeks	<i>Beyond the Limits</i>

¹ Thanksgiving

14	1/8	1/25	2 weeks	<i>World Dynamics</i> , Chapters 5-7
15	1/22	2/1	1 week	Dynamic Simulation Models, How Valid are They? (D-4463) Exploring S-shaped Growth (D-4476) Mistakes and Misunderstandings: Table Functions (D-4653)
16	1/29	2/15	2 weeks	Building a System Dynamics Model Part 1: Conceptualization (D-4597) Conceptualization Exercises: TBA
17	2/12	3/1	2 weeks	Graphical Integration Exercises Part Five: Qualitative Graphical Integration (D-4675) Modeling Exercise: Fishbanks
18	2/26	3/8	1 week	<i>Principles of Systems</i> , Chapter 4 Exponential Smoothing Systems Thinking: Critical Thinking Skills for the 1990s and Beyond (D-4565) Mistakes and Misunderstandings: Use of Generic Structures and Reality of Stocks and Flows (D-4646)
19	3/5	3/15	1 week	Credit Card Model (D-4683) Answers to Exercises for Chapter 17: Introduction to Delays from <i>Introduction to Computer Simulation</i> (D-4415-4) Graphical Integration Exercises Part Six: Integrating Exponentials System Dynamics, Systems Thinking, and Soft OR (D-4405-1)
20	3/12	3/29	2 weeks ²	Graphical Integration Exercises Part Seven: Integrating Sinusoids Generic Structures in Oscillating Systems I (D-4426-1) Modeling Exercise: Addiction Mistakes and Misunderstandings: DT Error (D-4695)
21	3/26	4/5	1 week	<i>Industrial Dynamics</i> , Chapter 2 Modeling Exercise: Beer Game, part 1
22	4/2	4/19	2 weeks	Introduction to Sensitivity Analysis (D-4526) <i>Principles of Systems</i> , Section 2.5 Independent Exercise: Sensitivity Analysis of market growth model Learning through System Dynamics as preparation for the 21st century (D-4434-1)

² Spring Break

23	4/16	4/26	1 week	<i>Industrial Dynamics</i> , Chapter 5 <i>Principles of Systems</i> , Chapter 5 Modeling Exercises: Section 1 (D-4421)
24	4/23	5/3	1 week	Oscillating Systems II: Sustained Oscillations (D-4602) Modeling Exercise: Beer Game, part 2
25	4/30	5/10	1 week	Generic Structures: Exponential Material Delays (D-4614)) <i>Industrial Dynamics</i> , Chapter 9 Modeling Exercise: Alcohol
26	5/7	5/24	2 weeks	Mistakes and Misunderstandings: Expanding Oscillation Error Building a System Dynamics Model Part 2: Formulation Independent Exercises: Formulating models from assignment 16
27	5/21	6/7	2 weeks	A Skeptic's Guide to Computer Models (D-4101-1) Generic Structures: Overshoot and Collapse (D-4480) Independent Exercise: Sensitivity analysis of table functions
28	6/4	6/14	1 week	Economics Supply and Demand (D-4388) Modeling Exercises Section 2 (D-4451-1)
29	6/11	6/28	2 weeks	Second-Order Systems Generic Structures: Damped Oscillations Modeling Exercise: Waste Disposal
30	6/25	7/12	2 weeks	Properties of Damped Oscillations Systems Modeling Exercise: Forest fires