MATH 4428
Mathematical Modeling

Spring 2016 — Lecture 1

Week I

Lecture:	We 1/20, Fr 1/22
Topics:	Mathematical Modeling (1.1) **Part I: Optimization models** One variable optimization (1.1) Sensitivity analysis (1.2)

Week II

Lecture:	Mo 1/25, We 1/27, Fr 1/29
Topics:	Sensitivity analysis (cont., 1.2) Multivariable optimization (2.1) Lagrange multipliers (2.2)

Week III

Lecture:	Mo 2/1, We 2/3, Fr 2/5
Topics:	Lagrange multipliers (cont., 2.2) Sensitivity analysis for constrained problems (2.3) Computational methods for optimization problems (3.1, 3.2)

Week IV

Lecture:	Mo 2/8, We 2/10, Fr 2/12
Topics:	Computational methods for optimization problems (cont., 3.1, 3.2)
Homework:	Homework I due on Friday, Feb. 12

Week V

Lecture:	Mo 2/15, We 2/17, Fr 2/19
Topics:	Linear programming (3.3) (Review)
Midterm:	**Midterm I on Friday, Feb. 19 (in class)**

Week VI

Lecture:	Mo 2/22, We 2/24, Fr 2/26
Topics:	Linear programming (cont., 3.3) Discrete Optimization (3.4) **Part II: Dynamic models** Dynamical systems (4.2)

Week VII

Lecture:	Mo 2/29, We 3/2, Fr 3/4
Topics:	Steady state analysis (4.1) Discrete time dynamical systems (4.3) Stability analysis (5.1)
Homework:	Homework II due on Friday, Mar. 4

Week VIII

Lecture:	Mo 3/7, We 3/9, Fr 3/11
Topics:	Stability analysis (cont., 5.1, 5.2) Phase portraits (5.3)

Week IX

Lecture:	Mo 3/14, We 3/16, Fr 3/18
	Spring break

Week X

Lecture:	Mo 3/21, We 3/23, Fr 3/25
Topics:	Simulation of dynamic models (6.1, 6.2, 6.3)
Homework:	Homework III due on Friday, Mar. 25

Week XI

Lecture:	Mo 3/28, We 3/30, Fr 4/1
Topics:	Simulation of dynamic models (cont., 6.1, 6.2, 6.3) (Review)
Midterm:	**Midterm II on Friday, Apr. 1 (in class)**

Week XII

Lecture:	Mo 4/4, We 4/6, Fr 4/8
Topics:	Numerical stability (6.4) **Part III: Probability models** Probability models (7.1, 7.2)

Week XIII

Lecture:	Mo 4/11, We 4/13, Fr 4/15
Topics:	Probability models (cont., 7.1, 7.2) Statistical models (7.3)
Homework:	Homework IV due on Friday, Apr. 15

Week XIV

Lecture:	Mo 4/18, We 4/20, Fr 4/22
Topics:	Diffusion (7.4)

Week XV

Lecture:	Mo 4/25, We 4/27, Fr 4/29
Topics:	Markov Chains and Markov Processes (8.1, 8.2)

Week XVI

Lecture:	Mo 5/2, We 5/4, Fr 5/6
Topics:	Simulation of probability models Monte Carlo Simulation (9.1) (Review)
Homework:	Homework V due on Friday, May 6

Week XVII

Final: **Final on Wednesday, May 11**