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