

Course Outline

Week	Lecture	Description	Reading	Assignment
1	<i>Part I. Course Introduction</i>			Homework 1 out (due in 1 week)
	01	Introduction	1–1.4	
	<i>Part II. Network Equations</i>			
	02	Elements and Networks	2–2.2	
2	03	Cycle and Bond Spaces	2.2, 2.3	Homework 2 out (due in 1 week)
	04	Linear Algebraic Equations	2.4–2.4.3	
	05	Modified Nodal Analysis	2.4.4–2.5.2	
	<i>Part III. Solution of Linear Algebraic Circuit Equations</i>			
3	06	Solving Linear Algebraic Equations	3–3.1.1	Homework 3 out (due in 1 week)
	07	Gaussian Elimination	3.1.2, 3.1.3	
	08	LU Factorization	3.1.3	
	09	Gauss' LU Method	3.1.3–3.1.5	
4	10	Accuracy and Stability	3.2–3.2.1	Project 1 out (due in 3 weeks)
	11	Stability of Gaussian Elimination	3.2.2–3.2.5	Homework 4 out (due in 1 week)
	12	Pivoting for Accuracy	3.2.5, 3.2.6	
5	13	Conditioning	3.2.6, 3.2.7	
	14	Iterative Methods	3.3	
	15	Partitioning	3.4	
6	16	Sparse Matrix Methods	3.5–3.5.4	Homework 5 out (due in 2 weeks)
	17	Markowitz Pivoting	3.5.5–3.5.7	
	18	Pivoting for Sparsity	3.5.7, 3.5.8	
7	—	Reading Week – no classes.	—	
8	<i>Part IV. Solution of Nonlinear Algebraic Circuit Equations</i>			Homework 6 out (due in 2 weeks)
	19	Nonlinear Algebraic Circuit Equations	4–4.2.1	
	20	Introduction to Newton's Method	4.2.2, 4.2.3	
	21	Newton's Method	4.2.3, 4.2.4	
9	22	Quasi-Newton Methods	4.2.5–4.3.2	Project 2 out (due in 3 weeks)
	23	Application to Simulation	4.3.3–4.3.6	
	24	Companion Models	4.3.6, 4.3.7	
10	25	Quasi-Newton Methods in Simulation	4.4–4.4.1	Homework 7 out (due in 2 weeks)
	26	Continuation and Homotopy Methods	4.4.2–4.4.5	
	<i>Part V. Solution of Differential Circuit Equations</i>			
	27	Differential Circuit Equations	5–5.2.1	
11	28	Overview of Solution Methods	5.2.2, 5.2.3	
	29	Quality Metrics	5.2.4	
	30	Linear Multistep Methods	5.2.5–5.3.4	
12	31	Deriving the LMS Methods	5.3.5–5.3.7	Project 3 out (due in 2 weeks) Homework 8 out (due in 2 weeks)
	32	Local Truncation Error	5.3.7, 5.3.8	
	33	Stability of LMS Methods	5.4–5.4.3	
13	34	Regions of Absolute Stability	5.4.3–5.4.6	
	35	Trapezoidal Ringing, Variable Time-Step	5.5, 5.6	
	36	Application to Circuit Simulation	5.7–5.7.3	
14	37	Discretization and Companion Models	5.7.3, 5.7.4	
	38	Charge/Flux-Based Models	5.7.5	
	39	Dynamic MTEs and Time-Step Control	5.7.6–5.7.9	