

Santa Clara University
 Department of Electrical Engineering
 Aleksandar I. Zecevic
 Winter 2017

ELEN 118: Fundamentals of Computer-Aided Circuit Simulation
 TEXT: *Computer Methods for Circuit Analysis and Design*, Vlach and Singhal, 1994

SYLLABUS

WEEK		TOPICS	CHAPT.
1	01/09	Introduction to sparse matrices	2
2	01/16	The minimal degree algorithm Other methods for ordering sparse matrices	2
3	01/23	Modified nodal equations Stamps for linear elements	4
4	01/30	AC analysis of linear circuits Nonlinear algebraic equations Newton's method	4, 12
5	02/06	DC analysis of nonlinear circuits	12
6	02/13	DC analysis of nonlinear circuits (continued) Stamps for linear capacitors and inductors	12
7	02/20	Numerical solution of differential - algebraic equations MIDTERM	13
8	02/27	Numerical solution of differential - algebraic equations (continued)	13
9	03/06	Transient analysis of nonlinear circuits	11, 13
10	03/13	Transient analysis of nonlinear circuits (continued)	11, 13

FINAL EXAM: Tuesday, March 21, 6:30 p.m. – 9:30 p.m.

LEARNING OUTCOMES

Students who successfully complete this course should be able to:

1. Represent sparse matrices in terms of undirected graphs.
2. Solve large, sparse systems of equations using various ordering strategies.
3. Numerically solve systems of nonlinear algebraic and differential equations.
4. Describe large-scale circuits in a format that is suitable for computer-aided simulation.
5. Emulate different types of SPICE simulation in Matlab (using their own code).
6. Understand the mathematical techniques that are used in circuit simulation packages such as SPICE.

GENERAL INFORMATION

OFFICE: Engineering Center, Room 223
 OFFICE HOURS: Tuesday 4:00 - 5:00
 Thursday 4:00 - 5:00
 PHONE: (408) 554-2394
 FAX: (408) 554-5474
 E-MAIL: azecevic@scu.edu
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The course will have five projects, which will involve programming in Matlab and verification in SPICE. Each project will carry 5% of the course grade. The project titles are:

Project 1	Sparse matrices and m - files in Matlab
Project 2	AC simulation of active filters
Project 3	AC analysis of linear amplifiers
Project 4	DC analysis of nonlinear circuits
Project 5	Transient analysis of digital circuits

GRADING

Homework 10%
 Projects 25%
 Midterm 25%
 Final 40%

Academic Integrity Pledge:

“I am committed to being a person of integrity. I pledge, as a member of the Santa Clara University community, to abide by and uphold the standards of academic integrity contained in the Student Conduct Code.”

Disabilities Resources:

To request academic accommodations for a disability, students must be registered with Disabilities Resources, located in Benson, room 216. In order to register, please go on-line to www.scu.edu/disabilities. You will need to register and provide professional documentation of a disability prior to receiving academic accommodations. It is best to read “Required Documentation” on the website before starting the registration process in order to determine what is needed. You may contact Disabilities Resources at [408-554-4109](tel:408-554-4109) if you have questions.

To be in compliance with Title IX and the ADA/Section 504, a school must offer appropriate accommodation to a student whose absence is related to pregnancy or childbirth. If you are in need of an accommodation, contact the professor at the beginning of the course so that arrangement can be made. The student must also contact Disability Resources (DR) at [\(408\) 554-4109](tel:408-554-4109) or www.scu.edu/disabilities to register for accommodations.

Santa Clara University upholds a zero tolerance policy for discrimination, harassment and sexual misconduct. If you (or someone you know) has experienced discrimination or harassment including sexual assault, domestic and dating violence or stalking, we encourage you to tell someone what happened promptly. For more information, please go to www.scu.edu/studentlife or contact the university's EEO and Title IX Coordinator, Belinda Guthrie at [408-554-4113](tel:408-554-4113) or by email at bguthrie@scu.edu. Look at: <http://www.scu.edu/affirmativeaction/compliancelinks.cfm>.