

ECE599: Phase-locked loops T/TR 10:00 - 11:50am, Room: KEC 1005

Instructor: Pavan Kumar Hanumolu, hanumolu@eecs.oregonstate.edu
Office: KEC 4097, Ph: 737-2178
Office hours: By appointment
Textbook: No text book needed
Prerequisites: ECE520
Course website: <http://web.engr.oregonstate.edu/~hanumolu/ece599.htm>

Course Description: Analysis and design of phase-locked loop (PLL) architectures and circuits for communication systems. Emphasis on fundamental understanding, design intuition, and implementation of PLLs in modern-day CMOS processes. Topics include acquisition, tracking, noise properties of PLLs, integer/fractional-N PLLs, digital PLLs, delay-locked loops, and clock and data recovery circuits.

Course Outline:

Week 1Introduction; PLL applications; Basic concepts
Week 2PLL type/order; Tracking
Week 3Acquisition
Week 4Phase/Frequency detectors
Week 5ISSCC
Week 6Charge-pump PLLs; Noise analysis
Week 7Loop components: PFD; Charge-pump
Week 8Loop components: Oscillators; Dividers
Week 9Clock and data recovery PLLs
Week 10Project presentations

Grading Policy:

Homework 30%
Midterm 30%
Project 35%
In-class participation 5%

Reference books:

- F. Gardner, *Phaselock Techniques*, John Wiley & Sons, 2005.
- D. Wolaver, *Phase-Locked Loop Circuit Design*, Prentice-Hall, 1991.
- W. Egan, *Phase-Lock Basics*, John Wiley & Sons, 1998.
- R. Best, *Phase-Locked Loops : Design, Simulation, and Applications*, McGraw Hill, 2003.

Date	Topic	HW/Projects
Tue. Jan 8	Course overview, PLL applications	
Thu. Jan. 10	Basic concepts	
Tue. Jan. 15	PLL types/orders, Stability analysis	
Thu. Jan. 17	Tracking	HW # 1 due
Tue. Jan. 22	Acquisition	
Thu. Jan. 24	Acquisition (cont'd)	HW # 2 due
Tue. Jan. 29	Phase detectors	
Thu. Jan. 31	Frequency detectors	HW # 3 due
Tue. Feb. 5	ISSCC	
Thu. Feb. 7	ISSCC	HW # 4 due
Tue. Feb. 12	Charge-pump PLLs	Project out
Thu. Feb. 14	Noise analysis	HW # 5 due
Tue. Feb. 19	Phase/frequency detector circuits	
Thu. Feb. 21	Charge-pump circuits	HW # 6 due
Tue. Feb. 26	Oscillators	
Tue. Feb. 28	Oscillators (cont'd)	HW # 7 due
Thu. Mar. 4	Mid-term exam	
Tue. Mar. 6	Clock and data recovery PLLs	
Tue. Mar. 11	Project presentations	Project due
Tue. Mar. 13	Project presentations, Feedback	