UNIVERSITY OF CALIFORNIA AT BERKELEY
Mechanical Engineering

ME 237
CONTROL OF NONLINEAR DYNAMIC SYSTEMS
Fall 2011
MW 4:00-5:30
3109 Etcheverry Hall

Instructor:	J.K. Hedrick	Reader : Selina Pan
Office:	5104 Etcheverry Hall	Office: TBA
Office Hours:	MW 3:00-4:00	Office Hours: TBA
	OR BY APPOINTMENT	Discussion Section: TBD
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RECOMMENDED READING
(Most on reserve at Kresge Engineering Library)

*Slotine, J.J., and Li. W.P., *Applied Nonlinear Control*, Prentice-Hall, 1991 (SL)

*Khalil, H., *Nonlinear Systems*, 3nd Ed., Macmillan, 2002 (K)
Song, B., and Hedrick, J.K., *Dynamic Surface Control of Uncertain Nonlinear Systems: An LMI Approach,* Springer, 2011 (SH)

Isidori, A., *Nonlinear Control Systems*, 2nd Ed., Springer, 1989 (I)

Nijmeijer and Van der Schaft, *Nonlinear Dynamical Control Systems*, 1989 (NV)

Graham and McRuer, *Analysis of Nonlinear Control Systems*, Dover Press, 1971 (GM)

Guckenheimer and Holmes, *Nonlinear Oscillations, Dynamical Systems, and Bifurcation of Vector Fields*, Springer-Verlag, 1983 (GH)

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COURSE OUTLINE

WEEK	TOPIC	REFERENCE
1, 2	Introduction, General properties of linear and nonlinear systems, Phase Plane Analysis, Equilibrium finding	SL, GM
3	Qualitative Analysis of Nonlinear Systems, The Center Manifold theorem	GH
4	Controllability & Observability of Nonlinear Systems	I, NV, SL
5,6,7	Stability of Nonlinear Systems: • Lyapunov Theorems • Frequency Domain Criteria • Small Gain Theorem	K, SL
8,9	Feedback Linearization	SL
10,11,12,13	Sliding Control Theory • SISO • MIMO • Adaptive • Discrete • A unified design methodology	SL,SH class notes SH
14	Nonlinear Observers • Lyapunov • Geometric • Sliding • Compensators	SH, class notes
15	Describing Functions	GM, GV, SL

GRADING   6 homework sets   (20%)
1 term project   (40%)
1 oral exam   (40%)

Term Project due: End of semester
Oral Final: End of Semester