

EEE 442/542 Nonlinear Systems

Spring 2010

Information Sheet

Instructor : Ömer Morgül

Office/Phone : EE408/1529

Office Hours : Thurs. 15:30 - 17:30.

TA : N. Saldı

Class Time : Tue. 10:40-12:30 (EE03)

Fri. 8:40-10:30 (EE03)

• Tentative Course Schedule

- 1 : Introduction (Linear vs. Nonlinear)
- 2 : Mathematical Preliminaries
- 3 : Second Order Systems
- 4 : Describing Function Analysis
- 5 : Lyapunov Stability
- 6 : Input/Output Stability
- 7 : Analysis of Feedback Systems
- 8 : Feedback Linearization
- 9 : Sliding Control
- 10 : Singular Perturbation
- 11 : Gain Scheduling, Extended Linearization
- 12 : Nonlinear Servomechanisms
- 13 : Averaging

• Books on Control

J. J. E. Slotine, W. Li, *Applied Nonlinear Control*, Prentice-Hall, N. Y., 1991.

Vidyasagar, M., *Nonlinear Systems Analysis*, Prentice-Hall, N.Y., 1978, 1993.

H. K. Khalil, *Nonlinear Systems*, Macmillan, 1992, 1996, 2002.

S. Sastry, *Nonlinear Systems : Analysis, Stability and Control*, Springer-Verlag, 1999.

Desoer, C.A., Vidyasagar, M., *Feedback Systems : Input/Output Properties*, Academic Press, N.Y., 1975.

Isidori, A., *Nonlinear Control Systems : An Introduction*, Springer-Verlag, Berlin, 1985, 1995.

H. Nijmeijer, A. J. Van der Schaft, *Nonlinear Dynamical Control Systems*, Springer Verlag, 1990.

Books on Analysis

Hirsch, M., Smale, S., *Differential Equations, Dynamical Systems, and Linear Algebra*, Academic Press, N.Y., 1974.

Guckenheimer, J., Holmes, P. J., *Nonlinear Oscillations, Dynamical Systems and Bifurcations of Vector Fields*, Springer-Verlag, N.Y., 1983.

Rudin, W. R., *Principles of Mathematical Analysis*, McGraw-Hill, N.Y., 1976.

Fleming, W., *Functions of Several Variables*, Springer-Verlag, N.Y., 1977.

Hale, J. K., *Ordinary Differential Equations*, Wiley-Interscience, N.Y., 1969.

You can get additional references in the library. The related books are usually indexed by the call number QA402...

Other Materials : MATLAB.

Grading : 2 Midterms : 30% (each), Final : 40%

Exam Schedule :	Midterm 1	Friday, March 19
	Midterm 2	Wed., April 28.
	Final	Not scheduled yet.

Course Policy :

1 : Students are required to check the course web site frequently for course related announcements.
For course web page, see : <http://www.ee.bilkent.edu.tr/~eee442/>