Department of Mechanical Engineering
University of California at Berkeley
ME 273 Oscillations in Linear Systems
Fall Semester 2017

Instructor: Fai Ma
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Consultation Hours: TuTh 1-2.30 pm

Class Location and Website
TuTh 3.30-5 pm, 3107 Etcheverry Hall; course website at http://bcourses.berkeley.edu

Course Prerequisite
ME 133 Mechanical Vibrations

Textbook
There is not a single book that covers the required material of this course. A good purchase is:
J. L Humar, *Dynamics of Structures*, 3*rd* ed., CRC Press, Boca Raton, Florida, 2012.

Supplementary Reference
A. K. Chopra, *Dynamics of Structures: Theory and Applications to Earthquake Engineering*, 5*th* ed., Pearson, Hoboken, New Jersey, 2017.

Course Contents
Response of discrete and continuous dynamical systems, damped and undamped, to harmonic and general time-dependent loading. Convolution integrals and Fourier and Laplace transform methods. Lagrange's equations; eigensolutions; orthogonality; generalized coordinates; nonreciprocal and degenerate systems; Rayleigh's quotient.

Class Rules
Homework problems will be assigned from time to time. Two progress examinations are planned (the final examination will not be given on Friday, 12/15/2017, 7-10 pm as originally scheduled). Examinations must be taken as scheduled. Approximate contributions to the final grade are as follows:

Midterm Examination on Thursday, 10/19/2017, 3.30-5 pm	40%
Final Examination on Thursday, 11/30/2017, 3.30-5 pm	60%

Course Objectives
To give a compact, consistent, and reasonably connected account of the theory of linear vibration at the advanced level. A secondary purpose is to survey some topics of contemporary research. Applications will be mentioned whenever feasible.

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Additional References

H. Benaroya, S. M. Han and M. Nagurka, *Probabilistic Models for Dynamical Systems*, 2*nd* ed., CRC Press, Boca Raton, Florida, 2013.

G. Genta, *Vibration Dynamics and Control*, Springer, New York, 2009, available online at http://www.springerlink.com/content/978-0-387-79579-9

M. Geradin and D. J. Rixen, *Mechanical Vibrations: Theory and Application to Structural Dynamics*, 3*rd* ed., Wiley, West Sussex, United Kingdom, 2015.

D. T. Greenwood, *Principles of Dynamics*, 2*nd* ed., Prentice Hall, Englewood Cliffs, New Jersey, 1988.

P. Hagedorn and A. DasGupta, *Vibrations and Waves in Continuous Mechanical Systems*, Wiley, Hoboken, New Jersey, 2007.

R. A. Horn and C. R. Johnson, *Matrix Analysis*, Cambridge University Press, Cambridge, United Kingdom, 1985.

D. J. Inman, *Engineering Vibration*, 4*th* ed., Pearson, Upper Saddle River, New Jersey, 2014.

L. Meirovitch, *Principles and Techniques of Vibrations*, Prentice Hall, Upper Saddle River, New Jersey, 1997.

D. E. Newland, *Mechanical Vibration Analysis and Computation*, Longman, Essex, United Kingdom, 1989 (republished by Dover, New York, 2006).

S. S. Rao, *Vibration of Continuous Systems*, Wiley, Hoboken, New Jersey, 2007.

S. S. Rao, *Mechanical Vibrations*, 6*th* ed., Pearson, Hoboken, New Jersey, 2017.

T. D. Rossing and N. H. Fletcher, *Principles of Vibration and Sound*, 2*nd* ed., Springer, New York, 2004.

J. W. Strutt (Lord Rayleigh), *The Theory of Sound*, Vol. I, Dover, New York, 1945 (reprint of the 1894 edition).

W. Weaver, Jr., S. P. Timoshenko and D. H. Young, *Vibration Problems in Engineering*, 5*th* ed., Wiley-Interscience, New York, 1990.