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Fall 2019

ME 630-101: Analytical Methods in Machine Design

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Course Description: ME 630 - Analytical Methods in Machine Design (3 credits)

Professor R. Sodhi

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Prerequisites: undergraduate differential equations, machine design, and ME 616. (May be taken concurrently.) Theory and analytical methods used in machine design. Comparisons are made between approximate and exact engineering methods for evaluation of the range of applicability of solutions. Topics include advanced analysis of threaded members; keyed, splined, and shrink fits when subjected to torque; preloaded bearings; surging, presetting and buckling of coiled springs; and accurate analysis of impact stresses and stresses beyond the yield point.

Topics:

1) Principles of Design
2) Working stresses
3) Theories of failure
4) Fatigue
5) Shaft Design
6) Springs- Optimum Design
7) Thick walled Cylinders – Rotating Disks
8) Interference Fits
9) Hertz Contact Stresses, Bearings
10) Impact Loading with applications
11) Optimum Design
12) Bolted Connections
13) Design for Additive Manufacturing (3D Printing)

Text: Typed Notes provided by Professor Sodhi and posted on the NJIT Moodle

References:

1) Timoshenko and Geere, Theory of Elasticity, McGraw Hill
2) Mechanical Engineering Design, Shigley
3) Mechanical Design Analysis, M.F. Spotts
4) Fundamentals of Machine Component Design, Juvinall and Marshek, Wiley

Grading:

Mid – Term Exams	50%
Final Exam	35%
Home Work and Projects	15%