MECH 6945 - Advanced Dynamics

Fall 2026 Syllabus, Section 01, CRN 43782,

Credit hours: 3

Instructor

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Associate Professor

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Public Instructor Information

Instructor Title: Associate Professor
Instructor Professional Qualifications:
PhD, Mechanical Engineering, Iowa State University
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Course Description

6945. Advanced Dynamics. Three-dimensional vector statics; kinematics and kinetics of particles and rigid bodies; energy, momentum, and stability. LaGrange's equations of motion for particles and rigid bodies impulse; small oscillations; nonholonomic and dissipative systems. Prereq.: Permission of graduate advisor. 3 s.h.

Course Readings

Group	Title	Author	ISBN
Required	Engineering Dynamics	J Ginsberg	9780511805899

Publisher: Cambridge University Press
Online publication date: June 2012
Print publication year: 2007
Online ISBN: 9780511805899
DOI: https://doi.org/10.1017/CBO978051180589

The course readings are subject to change in the event of extenuating circumstances, research developments, current events, and/or to ensure better learning.

Schedule of Topics and Assignments

Day	Date	Proposed Topic	Due/To Prepare for Class
Tue	8/25	Introduction & Vector Review	
Thu	8/27	Particle Motion in Cartesian Coordinates	
Tue	9/1	Normal–Tangential Coordinates	
Thu	9/3	Polar/Cylindrical Coordinates	
Tue	9/8	Particle Kinematics Applications	
Thu	9/10	General Plane Motion: Velocity	
Tue	9/15	Instantaneous Center of Zero Velocity	
Thu	9/17	General Plane Motion: Acceleration	
Tue	9/22	Rolling & Mechanism Kinematics	
Thu	9/24	Moving Reference Frames	

Tue	9/29	Relative Velocity in Rotating Frames
Thu	10/1	Relative Acceleration & Coriolis Acceleration
Tue	10/6	Moving-Frame Applications
Thu	10/8	Three-Dimensional Rigid-Body Kinematics
Tue	10/13	3-D Velocity & Acceleration
Thu	10/15	3-D Rotation Applications
Tue	10/20	Particle Kinetics: Newton's Second Law
Thu	10/22	Particle Kinetics in n–t and Polar Coordinates
Tue	10/27	Particle Kinetics Applications
Thu	10/29	Work and Kinetic Energy
Tue	11/3	Potential Energy & Conservation of Energy
Thu	11/5	Impulse and Momentum
Tue	11/10	Rigid-Body Mass Properties
Thu	11/12	Planar Rigid-Body Equations of Motion
Tue	11/17	Fixed-Axis Rotation
Thu	11/19	General Plane Motion
Tue	11/24	Rigid-Body Work–Energy
Thu	11/26	Rigid-Body Impulse–Momentum
Tue	12/1	Integrated Dynamics Problems & Course Synthesis
Thu	12/3	Final week
Tue	12/8	Final week

The course schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better learning.