ME 314: Theory of Machine Dynamics
Syllabus

Dr. Todd D. Murphey

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Office Hours TBD

Office Location: Tech D155

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Location: Tech L150
Time: MWF 12:00-12:50 PM
URL: The Blackboard suite at *https://courses.northwestern.edu/webapps/login/*
TA: Jarvis Schultz *jarvisschultz2012@u.northwestern.edu*
Textbook: The required textbook is *Introduction to Classical Mechanics* by David Morin (available on amazon.com for $64.00, used for $50.00). We will use excerpts from *A Mathematical Introduction to Robotic Manipulation* by Murray, Li, and Sastry (available at http://www.cds.caltech.edu/∼murray/mlswiki for free download). Class notes will also be used as needed.
Software: *Mathematica* (Student edition available for $45).
Topics Covered: This class covers the fundamentals of multi-body rigid body mechanics. The class has an applied focus and students will be expected to model novel systems—both in teams and individually—using what they learn. Topics include geometry of rigid bodies, rotating bodies, Lagrangian mechanics, impact dynamics, and numerical methods that may be used to simulate mechanical systems. Case studies from industry will be used to illustrate concepts in class.
Prerequisites: ME 202, Mechanics II.

The class outline is roughly as follows.

	Topic
1	Types of problems we care about
2	Dynamics of point masses and variational principles
3	Conservation of energy and momentum and collisions
4	Lagrangian mechanics
5	Lagrangian dynamics with constraints and external forcing
6	Rotating bodies and angular momentum
7	Creating and evaluating numerical methods
8	Geometry and kinematics
9	Using Geometry and kinematics in Lagrangian mechanics

Testing, Homework, Grading

Grading will nominally be based on the following.

Homework:	50% of total grade.
Midterm/Final:	30% of total grade
Final Project:	20% of total grade.

However, students who turn in two *handwritten* copies of their class notes, one of which must be easily read by me, will at minimum get a C in the course so long as they have attempted the homework and the projects. (This provides a means for students to do acceptably in the course even if they are struggling.)

Note that I anticipate there will be no final exam and that the final project will take its place.

Disability Accommodation

If you qualify for accommodations because of a disability, please submit a letter to me from Northwestern's Disability Services in a timely manner so that your needs may be addressed. Please see *http://www.northwestern.edu/disability/* for more information.

Learning Environment

No one, including the instructor, is allowed to be rude. If someone is rude, he/she will be asked to leave.

Academic Integrity

Don't cheat or do anything you might be upset about if someone else did it. You can find a full explanation of Northwestern's and McCormick's policies on academic integrity at *http://www.northwestern.edu/uacc/*.