



ENGN 2070-201 Dynamics (3-0-3)

Syllabus

Spring 2018

Instructor:

Tzuyang Yu (Falmouth Hall 107-C, ext.4-2288, Tzuyang_Yu@UML.EDU)
Monday and Friday 2:00PM~3:00PM

Time and Venue:

Monday, Wednesday, and Friday 11:00AM~11:50AM, Ball Hall 328

Teaching Assistant:

Paul (Qixiang) Tang (Southwick 130, ext. 4-5953, Qixiang.Tang@STUDENT.UML.EDU)

Class website:

http://faculty.uml.edu/tzuyang_yu/Teaching/Teaching.aspx

Prerequisites: ENGN.2050 *Statics* and MATH.1320 *Calculus II*

Course Description

Vector development of kinematics of particles and rigid bodies with respect to fixed and moving coordinate systems of one, two, and three dimensions; the dynamics of particles, systems of particles, and rigid bodies; angular momentum and the inertial properties of rigid bodies; impulse, momentum and energy methods; and dynamic properties of single-degree-of-freedom (SDOF) systems.

Grading Policy

There will be eight homework assignments (6% each), three quizzes (10% each), and one final examination (22%) in this course. The late policy for homework is stated as follows: (1) 50% reduction for "up to one day" late; and (2) 100% reduction for "more than one day" late.

Textbook

R.C. Hibbeler (2015), *Engineering Mechanics – Dynamics*, 14th ed., Prentice Hall, Upper Saddle River, NJ.

Schedule

(Note: Symbol "()" indicates the date a homework assignment is issued, while symbol "[]" indicates the date a homework assignment is due.)

Week	Date	Topics
1	01/22	Fundamentals; rectilinear kinematics / (#1)
	01/24	Rectilinear kinematics; Curvilinear kinematics; motion of a projectile
	01/26	Curvilinear kinematics: normal and tangential components
2	01/29	Curvilinear kinematics: cylindrical components / [#1], (#2)
	01/31	Absolute dependent motion; relative motion
	02/02	Newton's second law of motion; motion of particles
3	02/05	Eqs. of motion: normal and tangential coord.; cylindrical coord.
	02/07	Principle of work and energy / [#2], (#3)
	02/09	Quiz 1
4	02/12	Conservative forces and potential energy
	02/14	Principle of linear impulse and momentum
	02/16	Conservation of linear momentum
5	02/20	Impact
	02/21	Impact / [#3], (#4)
	02/23	Angular momentum; principle of angular impulse and momentum
6	02/26	Angular momentum; principle of angular impulse and momentum
	02/28	Planar rigid-body motion; translation; rotation
	03/02	Planar rigid-body motion; translation; rotation / [#4], (#5)
7	03/05	Relative-motion analysis: velocity
	03/07	Relative-motion analysis: acceleration
	03/09	Quiz 2
8	03/12~16	<i>Spring Break</i>
9	03/19	Mass moment of inertia
	03/21	Mass moment of inertia / [#5], (#6)
	03/23	Method of instantaneous center of zero velocity
10	03/26	Planar kinetic equations of motion; translation; rotation
	03/28	General plane motion
	03/30	Kinetic energy; principle of work and energy
11	04/02	Conservation of energy
	04/04	Linear and angular momentum of rigid bodies; impulse and momentum
	04/06	Conservation of momentum / [#6], (#7)
12	04/09	Three-dimensional rotation of rigid bodies; Euler's theorem
	04/11	Three-dimensional general motion of rigid bodies
	04/13	Quiz 3
13	04/16	<i>Patriot's Day</i>
	04/18	Three-dimensional moments and products of inertia
	04/20	Angular moment and kinetic energy of three-dimensional rigid bodies
14	04/23	Angular moment and kinetic energy of three-dimensional rigid bodies / [#7], (#8)
	04/25	Three-dimensional equations of motion
	04/27	Three-dimensional gyroscopic motion and torque-free motion
15	04/30	Energy method in dynamics; vibration of SDOF systems / [#8]
	05/02	Final review