Syllabus

Thomas J. Watson School of Engineering and Applied Science
Department of Mechanical Engineering

ME 274 – Dynamics
Summer 2018
Colin Selleck

Lecture: Online Course, 3 credit hours. Both summer sessions are used so the course runs from late May to early August.

Email: cselleck@binghamton.edu

Office Hours: No official hours, but send email to the instructor. Emails read only 8-5, M-F (excluding holidays), so plan accordingly.

Forum: Since this is an online course, you are encouraged to use the discussion forum on Blackboard (click Discussion on the left side). Please post questions and reply to posts here.

Text: (required)
Hibbeler, R.C., "Engineering Mechanics: Dynamics, 14th edition",
ISBN-10: 0-13-300956-4
ISBN-13: 978-0-13-300956-9

Online resource (required):
Mastering Engineering (by Pearson)
Course ID: BUDYNAMICSM18
www.masteringengineering.com
All homework will be done online here. Please register as soon as possible. You may purchase an online version of the book here as well.

Prerequisites: Grade of C- or better in Statics, ME 273

Grading:

Homework	10%	A	95-100	C+	77-79
Exams (Two)	30%	A-	90-94	C	74-76
Final Exam	30%	B+	87-89	C-	70-73
		B	84-86	D	60-69
		B-	80-83	F	0-59

Students are encouraged to work together on assignments in order to better understand the material. However, a student must not submit another's student work as his or her own. **Academic dishonesty can result in course failure and dismissal from the University**

Students are responsible for all readings, video lectures, and homework listed in the lesson plan.

Course Objective:

This course covers fundamental issues from the field of particle and rigid-body kinematics and kinetics. The course combines high-level mathematics (calculus and differential equations), physics and basic engineering concepts. These are applied to investigate common problems in the dynamics of rigid-body mechanics utilizing fundamental principles involving forces and motion. Both theoretical development and applied problem solving are emphasized.

Upon successful completion of this course, the student will be able to:

- Explain and demonstrate the meaning of the terms: particle, rigid body, kinematics, kinetics, equilibrium, friction, and free-body diagram.
- Describe the motion of a particle using rectangular, polar, and path coordinates.
- For a particle or a system of particles, compute the force-motion relationship using Newton's law, energy methods, and impulse-momentum methods.
- Compute relative velocity and acceleration in rigid bodies using the fixed-vector concept.
- Compute the relative velocity and acceleration in rigid bodies using different references.
- Determine the plane motion and forces for a rigid body rotating about its axis of revolution.

ABET Student Outcomes:

- 3(a) an ability to apply knowledge of mathematics, science and engineering
- 3(b) an ability to design and conduct experiments, as well as to analyze and interpret data
- 3(e) an ability to identify, formulate, and solve engineering problems
- 3(g) an ability to communicate effectively
- 3(i) a recognition of the need for, and an ability to engage in life-long learning

CODE OF ETHICS OF ENGINEERS (as formulated by ASME)
<u>THE FUNDAMENTAL PRINCIPLES</u>
Engineers uphold and advance the integrity, honor, and dignity of the Engineering profession by:

- *using their knowledge and skill for the enhancement of human welfare;*
- *being honest and important, and serving with fidelity the public, their employers and client;*
- *striving to increase the competence and prestige of the engineering profession.*

Reading Topics:

- Syllabus, Course overview. Dynamics: overview of basic concepts and principles. Examples.
- Motion in moving coordinates. Different coordinate systems
- Linear and angular motion. Kinetic and Potential Energy
- Work. Work done by non-conservative forces.
- Linear Impulse and Momentum.
- Angular Impulse and Momentum
- Planar kinematics. Rigid-body motion. Translation, rotation about fixed axis. Absolute motion, relative motion.
- Planar kinetics: Equations of motion, moment of inertia.
- Kinetic energy. Work. Conservation of energy
- Non-conservative forces. Examples. Material overview + test preparation

Course Policies:

1. Homework is to be done online at www.masteringengineering.com. It is due by midnight on the Sunday after the module dates. There is also an adaptive follow-up homework due two days after the module homework which is individually generated for each student to reinforce areas in which you did not score well. Both homeworks are graded.
2. Any work (e.g., exams) handed in for credit is to be neat and professional; otherwise, it will not be accepted.
3. You are required to review the Watson Academic Honesty Policy: (http://www2.binghamton.edu/watson/about/honesty-policy.pdf)
4. All requests for test re-grading must be submitted/satisfied within one week of the return of the exam. Note that the entire exam may be rechecked and the final grade could go up, down, or remain unchanged. The decision of the instructor is final.
1. You will have 2 hours allocated for each of the two examinations during the semester and 3 hours for the final examination. Examinations are not open-book, but you are allowed to bring in one sheet of paper with whatever formulae, notes, diagrams, etc. that you feel are needed. You may use a single side of a standard 8.5" by 11" sheet of paper and notes must be handwritten. This equation sheet will be scanned before and after the exam and emailed to the instructor along with your exam. You also need to bring a calculator (any type) and writing utensils.
5. If you require special services due to a disability, you must provide a letter from the Office for Students with Disabilities (http://www2.binghamton.edu/ssd/)

Exam Proctor:

Students registered for this course will need to identify a person who can serve as the proctor for the examinations. The proctor form (in course documents) must be submitted to the instructor no later than the start of the second week of classes. You will be notified as to whether this person has been approved to serve as your proctor.

You must use a proctor found at your local library or learning center; contact them for details. Note that there may be a nominal charge for this service. If you are near Binghamton, the Binghamton University Learning Center offers this service free of charge; if you use this service, you do not need to submit a proctor form but do notify the instructor of your intent. Details are at http://binghamton.edu/clt/uwtc/. Note that the proctor email address must be from a library, teaching center, university, etc. It cannot be from gmail, yahoo, or the like.

The proctor will be responsible for receiving the exams, following the guidelines for administering the exam, and returning the exam to me. Your proctor must have an email address to which examinations can be sent. The exams are emailed to the proctor on Sunday of exam week and you have until 5 PM on the Friday of exam week to complete the exam. You may take the exam on any day (Monday - Friday) of exam week. Exams will be administered during the weeks of June 17, July 8, and July 29.