MAE 208: ENGINEERING DYNAMICS, SPRING 2024

INSTRUCTOR:

Dr. Joseph D Manning
jdmannin@ncsu.edu (Use "MAE 208" somewhere in the subject line)
Office: 1308 EB3
(919) 515-1353 (not always monitored. Email preferred)
Office hours: (in person or zoom) MoWe 12PM – 1:15PM Other times by appointment

PREREQUISITES:

MAE 206 with a grade of C or better, MA 242

GRADERS:

Nigel Liu <hliu19@ncsu.edu>
Heet Dipesh Shah <hshah8@ncsu.edu>
Office hours: TBD

SCHEDULE:

Time: MoWe 1:30-2:45 PM
Location: 2124 Engineerign Building 3
Website: WolfWare Moodle (MAE 208 Section 001)
Message Board: Moodle discussion forum

TEXTBOOK (RECOMMENDED, NOT REQUIRED):

R.C. Hibbeler, *Engineering Mechanics: Dynamics*, **any recent edition**, Prentice-Hall

COURSE DESCRIPTION:

An introduction to kinematics and kinetics of particles in rectangular, cylindrical, and curvilinear coordinate systems; energy and momentum methods for particles; kinetics of systems of particles; kinematics and kinetics of rigid bodies in two and three dimensions; motion relative to rotating coordinate systems.

COURSE OBJECTIVE:

To provide students with a fundamental understanding of the theory and applications of engineering dynamics

GRADING:

Midterm Exams (2)	40%	
Homework	20%	(due at beginning of class, lowest score dropped, **late homework will not be accepted**)
Project	20%	
Final Exam	20%	(will allow half midterm grade to be replaced with final if it is higher; lowest test 10% and final 30%)

GRADING SCALE (REQUIRED PERCENTAGES)

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
98	92	90	88	82	80	78	72	70	68	62	60

TENTATIVE SCHEDULE

Week	Topics	Reading
Jan 6, 8	**Course Introduction**	
	Particle Kinematics	
	Straight line motion	12.1-12.3
Jan 13, 15	Curved path motion	12.4-12.8
	Dependent and Relative motion analysis	12.9-12.10
Jan 22	**Particle Kinetics: Newton's Laws**	
	Newton's laws of motion	13.1-13.3
Jan 27, 29	Equations of motion: straight line	13.4
	Equations of motion: curved path	13.5-13.6
Feb 3	Midterm Exam Review	
Feb 5	**Midterm Exam #1**	
Feb 10, 12	**Particle Kinetics: Work and Energy**	
	Work and energy	14.1-14.3
	Power and efficiency	14.4
Feb 17, 19	Conservation of energy	14.5-14.6
	Particle Kinetics: Impulse and Momentum	
	Linear impulse and momentum	15.1-15.2
Feb 24, 26	Conservation of linear momentum	15.3
	Impact	15.4
	Angular impulse and momentum	15.5, 15.7
Mar 3, 5	**2D (Planar) Rigid Body Kinematics**	
	Translation	16.1-16.2
	Rotation	16.3
Mar 17	Midterm Exam Review	
Mar 19	**Midterm Exam #2**	
Mar 24, 26	**Projects Assigned**	
	General motion: absolute motion analysis	16.4
	Relative motion analysis: velocity and acceleration	16.5-16.7
Mar 31, Apr 2	**2D (Planar) Rigid Body Kinetics**	
	Equations of Motion (EOM)	17.2
	Mass moments of inertia	17.1
	Translation, rotation, and general plan motion	17.3-17.5
Apr 7, 9	**3D Rigid Body Kinematics**	

	Rotation about a fixed axis	20.1
	General motion	20.3
	Relative motion analysis: velocity and acceleration	20.4
Apr 14, 16	**3D Rigid Body Kinetics**	21.1, 21.2
	Angular momentum, inertia tensor	
	EOM	21.4
	Gyroscopic Motion	21.5
Apr 21	**Projects, Homework Due**	
	Final Exam Review	
Apr 28	**Final Exam:** 12-2:30 PM 2124 Engineering Building 3 (Tentative)	

NOTES

- This course deals extensively with the fundamentals of problem solving… **class attendance and attention to homework are highly recommended**.

- Homework is due at the beginning of class, and **late homework will not be accepted**.

- Academic dishonesty rules, as outlined in the NCSU Code of Student Conduct, will be strictly enforced. **Any suspected act of academic misconduct will be immediately referred to the NCSU Office of Student Conduct.**

- Students are encouraged to work in small groups and use additional reference materials for the solution of homework assignments and design projects. However, **copying and submitting the work of other students as your own is a violation of the NCSU Code of Student Conduct, and will be treated as such.**

- Note: copying figures, equations, or text from other sources without properly referencing these sources is **plagiarism: a violation of the NCSU Code of Student Conduct that will be referred to the NCSU Office of Student Conduct.**

- Students wishing to eat, sleep, surf the internet, read newspapers, talk on cellphones, etc. are encouraged to do so **outside of the classroom**.

- Any student with a disability who is registered with the NCSU Disability Resource Office (DRO) should schedule an appointment with Dr. Manning at the beginning of the semester to discuss academic accommodations. More information on DRO services and procedures can be found at http://dro.dasa.ncsu.edu.

- As members of the NC State Wolfpack community, we share the responsibilities of expressing concern for fellow classmates and ensuring that the classroom remains a safe environment for learning. If the behavior of a fellow classmate concerns or worries you, please report this to the NC State Students of Concern website: http://studentsofconcern.ncsu.edu/. Although you may report anonymously, it is recommended that you share your contact information for follow-up purposes.

- Online class evaluations will be available for students to complete during the last two weeks of the fall term. Students will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations.

  - Evaluation website: https://classeval.ncsu.edu/
  - Student help desk: classeval@ncsu.edu
  - More information about ClassEval: http://www.ncsu.edu/UPA/classeval/

HOMEWORK SUBMISSION GUIDELINES

> Use standard size (8 ½" by 11") Engineering Paper (green or yellow), not notebook paper, sheets from a spiral notebook, or the back side of previously used paper.

> Emphasize accuracy and readability. Please do not scribble, cross out errors, or write in the margins.

> Label each page with your name and staple all pages in the top left corner. Please do not fold homework submissions.

> Draw correct free-body diagrams whenever appropriate.

> Indicate the method of solution and any assumptions or approximations made.

> Identify answers clearly by enclosing them within a box.

> Engineering solutions are not complete without appropriate units.

> The goal of attempting homework is to arrive at a correct solution using an appropriate method, not to invent a method that produces the answer listed in the back of the book (they are frequently incorrect). Homework grading seeks to ensure that your method is in accordance with the theory and practice presented in class, and to provide appropriate guidance when this is not the case.

> Discussion, comparison, and validation of methods between classmates is acceptable and often helpful. However, each individual's submission is expected to represent his/her own personal level of understanding of the subject matter. **Students who regularly rely on classmates to help them start the solution process are more likely to struggle on exams. Copying or duplicating the work of other students and submitting it as your own, or silently condoning such practices, defeats the educational objectives of this course and will be considered a violation of the NCSU Code of Student Conduct.**