

Engineering Mechanics - Dynamics

EGM 3401 Class # 12954

Class Periods: MWF, Period 8, 3:00 PM – 3:50 PM

Location: Weil 270

Academic Term: Fall 2022

Instructor:

Professor B.V. Sankar

sankar@ufl.edu

Office Phone Number (352) 392-6749

Office Hours (Zoom): Tuesdays and Thursdays 9:30 – 10:30 AM (3rd period)

Instructor Zoom office hours link is available in Canvas

In-person meeting by appointment only

Teaching Assistant/Learning Assistant: (TBA)

Please contact through the Canvas website

Course Description

3 credits. Dynamics of particles and rigid bodies for rectilinear translation, curvilinear motion, rotation, and plane motion. Also includes principles of work and energy, and impulse and momentum. Three-dimensional rigid-body dynamics and orbital motion.

Course Pre-Requisites / Co-Requisites

Pre-requisites: EGM 2511 or EGM 2500, and MAC 2313.

Course Objectives

To provide a thorough and systematic introduction to the subject of dynamics of particles and rigid bodies using a Newton-Euler approach. To develop a deep understanding of the kinematics of particles and rigid bodies, the kinetics of a particle, the kinetics of a system of particles, and the kinetics of a rigid body. Many examples will provide insight into the underlying physical processes.

Materials and Supply Fees

None

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Low
3) an ability to communicate effectively with a range of audiences	Low
4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Low
5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Medium
6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Low
7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	High

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- Engineering Mechanics: Dynamics
- Author: R.C. Hibbeler
- Publisher and edition: 15th Edition, Pearson, 2022.
- ISBN number 9780134814988

Recommended Materials

None

Course Schedule

Lecture	Date	Day	Topic/Chapter	Assignment
1	24-Aug	Wed	Introduction and Review of Vector Algebra	
2	26-Aug	FRI	Ch 12. Kinematics of a Particle	
3	29-Aug	MON	Ch 12. Kinematics of a Particle	
4	31-Aug	Wed	Ch 12. Kinematics of a Particle	HW 01
5	2-Sep	FRI	Ch 12. Kinematics of a Particle	
-	5-Sep	MON	Labor Day	
6	7-Sep	Wed	Ch 12. Kinematics of a Particle	HW 02
7	9-Sep	FRI	Ch 12. Kinematics of a Particle	
8	12-Sep	MON	Ch 12. Kinematics of a Particle	
9	14-Sep	Wed	Ch 13. Kinetics: Force and Acceleration	Quiz 1 (Honorlock) HW 03
10	16-Sep	FRI	Ch 13. Kinetics: Force and Acceleration	
11	19-Sep	MON	Ch 13. Kinetics: Force and Acceleration	
12	21-Sep	Wed	Ch 13. Kinetics: Force and Acceleration	HW04
13	23-Sep	FRI	Ch 14. Kinetics: Work and Energy	
14	26-Sep	MON	Review	
-	28-Sep	Wed	Midterm Exam 1 (at home)	Exam 1 (Honorlock)
15	30-Sep	FRI	Ch 14. Kinetics: Work and Energy	
16	3-Oct	MON	Ch 14. Kinetics: Work and Energy	
17	5-Oct	Wed	Ch 15. Kinetics: Impulse and Momentum	HW 05
18	7-Oct	FRI	Ch 15. Kinetics: Impulse and Momentum	
19	10-Oct	MON	Ch 15. Kinetics: Impulse and Momentum	
20	12-Oct	Wed	Ch 15. Kinetics: Impulse and Momentum	HW 06
21	14-Oct	FRI	Ch 15. Kinetics: Impulse and Momentum	
22	17-Oct	MON	Ch 16. Planar Kinematics of a Rigid Body	
23	19-Oct	Wed	Ch 16. Planar Kinematics of a Rigid Body	Quiz 2 (Honorlock) HW 07
24	21-Oct	FRI	Ch 16. Planar Kinematics of a Rigid Body	
25	24-Oct	MON	Ch 16. Planar Kinematics of a Rigid Body	
26	26-Oct	Wed	Ch 17. Kinetics: Force and Acceleration	HW 08

27	28-Oct	FRI	Ch 17. Kinetics: Force and Acceleration	
28	31-Oct	MON	Review	
-	2-Nov	Wed	Midterm Exam 2 (Honorlock))	Exam 2 (Honorlock)
29	4-Nov	FRI	Ch 17. Kinetics: Force and Acceleration	
30	7-Nov	MON	Ch 17. Kinetics: Force and Acceleration	
31	9-Nov	Wed	Ch 18. Kinetics: Work and Energy	HW 09
-	11-Nov	FRI	Veterans Day	
32	14-Nov	MON	Ch 18. Kinetics: Work and Energy	
33	16-Nov	Wed	Ch 19. Kinetics: Impulse and Momentum	HW 10
34	18-Nov	FRI	Ch 19. Kinetics: Impulse and Momentum	
35	21-Nov	MON	Ch 20. 3D Kinematics of a Rigid Body	
-	23-Nov	Wed	Thanksgiving Holidays	HW 11 (due on Tuesday)
-	25-Nov	FRI	Thanksgiving Holidays	
36	28-Nov	MON	Ch 20. 3D Kinematics of a Rigid Body	Quiz 3 (Honorlock)
37	30-Nov	Wed	Ch 21. 3D Kinetics of a Rigid Body	HW 12
38	2-Dec	FRI	Ch 21. 3D Kinetics of a Rigid Body	
39	5-Dec	MON	Exam 3 (Honorlock)	Exam 3
40	7-Dec	Wed	Review	HW 13
	16-Dec	FRI	Optional Exam 4* (Honorlock)	Exam 4

***The fourth and final exam on December 16th is optional for those who want to improve their grades. In that case, the fourth exam grade will replace the lowest score of the first three exams irrespective of whether the score in the 4th exam is greater or less than the minimum of the first three.**

Attendance Policy, Class Expectations, and Make-Up Policy

Regular lectures will be held in person in Weil Hall, room 270. The instructor will also use Zoom for live streaming, and the lectures will be uploaded to Zoom cloud. Attendance at the in-person lectures is not required and will not be tracked.

All quizzes/exams are to be completed at home with prescribed time allotment, plus student accommodations as applicable. All homework assignments are also to be completed at home. No late homework will be accepted. However, two home-works with low scores will be dropped.

Please contact Professor Sankar via email if you need to make up any of the quizzes due to for example, illness. Documentation needed for any approved reasons for makeup exams.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Evaluation of Grades

Assignment	Points	Percentage of Final Grade
Homework Sets (~10)	20 each	10%
Quizzes (3)	20 each	30%
Midterm Exams (3)	60 each	60%
Exam 4 Optional*	60 points	

	TOTAL	100%
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Two HWs will be dropped. Quizzes and exams are closed book. Formula sheet will be supplied.

***Caution:** The fourth and final exam on December 16th is optional for those who want to improve their grades. In that case, the fourth exam grade will **replace** the lowest score of the first three exams irrespective of whether the score in the 4th exam is greater or less than the minimum of the first three.

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
92.0 - 100	A	4.00
89.0 - 91.9	A-	3.67
86.0 - 88.9	B+	3.33
82.0 - 85.9	B	3.00
79.0 - 81.9	B-	2.67
76.0 - 78.9	C+	2.33
72.0 - 75.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
62.0 - 65.9	D	1.00
59.0 - 61.9	D-	0.67
0 - 58.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing

staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

On-Line Students Complaints: <https://distance.ufl.edu/state-authorization-status/#student-complaint>.