ME 274: Basic Mechanics II – Spring 2026

School of Mechanical Engineering
Purdue University, West Lafayette and Indianapolis

Course description Particle kinematics (both 2D and 3D motion, including moving reference frame descriptions for each). Particle kinetics including Newton's laws, work/energy and impulse/momentum. Planar kinetics of rigid bodies. Kinetics for planar motion of rigid bodies including equations of motion and principles of energy and momentum. Introduction to linear vibrations with emphasis on single-degree-of-freedom systems.

Course schedule A topical schedule for the course is attached at the end of this syllabus.

Course instructors

	Lecture Time (MWF)	**Lecture Room**	**Office**	**Office hours**	**Email**
Manuel Salmerón	8:30-9:20AM	ME 1130	DLR 228-C	9:30-10:30, MW (ME 2008)	salmeron@purdue.edu
Chuck Krousgrill	9:30-10:20AM	ME 1061	ME 3061G	12:30-1:30, MWF (ME 3061G)	krousgri@purdue.edu
Christian Silva	10:30-11:20AM	ME 1130	DLR 228-C	8:30-10:20, MWF (ME 2008G)	cesilva@purdue.edu
Chuck Krousgrill	11:30AM-12:20PM	ME 1061	ME 3061G	12:30-1:30, MWF (ME 3061G)	krousgri@purdue.edu
Eugenio Frias-Miranda	12:30-1:20PM	ME 1130	ME 2164A	1:30-2:30, MWF (ME 2206)	efrias@purdue.edu
Lily Krest	1:30-2:20PM	ME 1130	ME 2147	2:30-3:30, MWF (ME 2147)	ckrest@purdue.edu
Clark Addis	3:30-4:20PM	ME 1061	HERL 2067	4:40-5:30, WF (HLAB 2067)	caddis@purdue.edu
Stephanie Andress	4:30-5:20PM	ME 1130	HLAB 1027	9:30-10:30, T 3:30-4:30, W (ME 2008A)	andresss@purdue.edu
Charles Schwartz	10:30-11:20AM (Indy)	ICTC 252 (Indy)	SL 260E (Indy)	(see below)	schwa158@purdue.edu
Austin McDonald	11:30AM-12:20PM (Indy)	ICTC 252 (Indy)	SL 260E (Indy)	12:30-1:00, MWF (outside lecture hall)	mcdona20@purdue.edu

Dr. Schwartz office hours (in EL-104): M: 12noon-1:30; T: 10-12noon; W: 3:30-4:30; F: 11:30-1:00.

Course TAs

Johnson Olatunde	jolatund@purdue.edu
Shouyang You	you100@purdue.edu
Qianyu Zhao	zhao482@purdue.edu
Alexander Evangelos Argyros	aargyros@purdue.edu
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Andrew Theriault	artheria@purdue.edu

Course Textbook The required course lecturebook: *Dynamics: A Lecturebook, 3rd Edition,* can be purchased from the University Bookstore.

Course website https://www.purdue.edu/freeform/me274/

The course website will be used for both threaded discussions and for the delivery of all course material. Example problem solutions from the lecturebook are posted as multimedia video/audio files on the course website. Use these solutions to help assess your ability to work the homework problems for that day. Homework video solutions will be made available on the website following the date of submission. Animations and simulations are presented on the website to assist you in visualizing motion and other concepts related to the topics of the course. All information related to homeworks and exams is available on the website. ***Please note that there will be NO Brightspace presence in the course since all course material will be delivered to you through the course website.***

Class meetings Your attendance is expected for all meetings during the semester. If you are unable to attend a class meeting, you are expected to contact your instructor prior to the start of the class period.

Homework There will be a homework assignment for every regular class period of the semester. Two problems will be included in each assignment. The problem statements will be posted on the course website on the date of the assignment. The homework is to be submitted on Gradescope by 11:59PM on the day of the next regular class period. Please see the pages on "*Homework guidelines*" and "*Homework format*" near the end of this document.

Course grading Your course grade will be based on a straight grading scale:

97-100% A+
93-97% A
90-93% A-
87-90% B+
83-87% B
80-83% B-

77-80% C+
73-77% C
70-73% C-
67-70% D+
63-67% D
60-63% D
< 60% F.

The breakdown percentages for the components of your course grade are the following:

1. *Homework and quizzes*: 25%
   Two homework problems are assigned per lecture. Completed homework assignments are to the submitted on Gradescope by 11:59PM of the due date. *Late homework will not be accepted.* A sample format is attached. Your work needs to be presented with a logical thought process and in a neat, easy-to-read style. Failure to do so can result in a loss of points in your homework grade. We will collect 39 homework assignments during the semester. At the end of the semester, your course homework score will be based on 36 homework assignments. That is, *you are able to miss submissions for 3 homework sets without penalty to your grade*.

2. *Midterm and final exams*: 75%
   You will be given two midterm term exams during the term and a final exam during the scheduled University final exam period. At the end of the term, the average of the two midterm exams will be compared against your final exam score. The higher of these two will be given a 50% weighting and the lower of these two will be given a 25% weighting in the computation of your course average from which your course grade is determined.

3. *Bonus points:* Your instructor may also announce additional homework/quiz bonus points for your section throughout the semester. *Your total combined HW/Quizzes/Bonus points will not exceed 25% of your final grade*.

Tutorial assistance

The discussion thread of the course website will be open 24/7 throughout the course. We will be closely monitoring this discussion thread, and you can expect a quick turn-around on your questions during normal daytime hours. During the remaining time, we will continue to monitor the discussion and provide assistance when needed. In addition, the course instructors and TAs will be providing interactive tutorial sessions/office hours. Your instructor will provide you with a schedule of tutorial/office hours during the first week of class. You are free to attend any of the office hours/tutorial sessions, as you are not restricted to just the office hours of your instructor.

Collaboration

Faculty and students working together can promote a fair and positive academic environment. All students are expected to conduct themselves in an ethical manner. Students are permitted to discuss homework assignments together, but should do their own work when preparing a problem solution). Any of the following is strictly prohibited in this course: copying from solution manuals, online resources (e.g., Chegg), or another student's work; using artificial-intelligence or machine-learning tools (e.g., ChatGPT); and posting course problems to online cheating services (e.g., Chegg). Please note that AI tools frequently get things wrong and cannot be relied upon for factual accuracy. Submitting solutions copied from the output of AI tools shortcuts your learning process and provides you with a false sense of learning. Exams are to be completed without unauthorized assistance.

Academic Integrity

Your instructor is a strong believer that the mission of the University can only be fulfilled in an environment of high academic integrity. Students are encouraged to review the University's policies on academic integrity, which is located at:
https://www.purdue.edu/odos/academic-integrity/
In addition, the Purdue University Honor Pledge is located at:
https://www.purdue.edu/provost/teachinglearning/honor-pledge.html
Suspected cases of academic integrity violations will be reported to the Dean of Students.

Questions?

Please see the following page entitled "*Some common questions at the start of the semester.*", and/or contact your instructor.

Emergency Preparedness

Though Purdue University is continuously preparing for natural disasters and human-caused incidents with the ultimate goal of maintaining a safe and secure campus, emergency preparedness is a personal responsibility. Please review the following items:

- To report an emergency, call 911.
- To obtain updates regarding an ongoing emergency, and to sign up for Purdue Alert text messages, view *www.purdue.edu/ea*
- There are nearly 300 Emergency Telephones outdoors across campus and in parking garages that connect directly to the Purdue Police Department (PUPD). If you ever feel threatened or need help, push the button, and you will be connected immediately.
- If we hear a fire alarm, we will immediately suspend class, evacuate the building, and proceed outdoors away from the building. Do not use the elevator.
- Emergency assembly area for ME building occupants:
  - Primary: Purdue Mall area outside MSEE.
  - Secondary (in case of inclement weather): Atrium of the MSEE building, located in the center of the building's first floor.
- If we are notified of a Shelter in Place requirement for a *tornado* warning, we will suspend class and shelter in the lowest level of the ME building away from windows and doors.

- If we are notified of a Shelter in Place requirement for a *hazardous materials release*, or a *civil disturbance*, including a shooting or other use of weapons, we will suspend class and shelter in our classroom, shutting any open doors or windows, locking or securing the door, and turning off the lights. If you are directed to shelter in place, but you are unaware of the specific reason, proceed to the lowest level of the building but continue to seek additional information by all possible means to determine the type of incident. Once you have determined the type of emergency, follow the below chart:

Emergency	***Emergency Assembly Area (EAA)***
Weather-Related / Tornado Warning	Basement corridors, basement offices, basement restrooms or the lowest level of the building (stay away from windows and doors)
Hazardous Materials (HAZMAT) Release	Remain or find an unaffected office or work area and close windows and doors
Civil Disturbance / Active Shooter	Seek a safe location, preferably a room without windows that can be locked or secured by barriers

Please review the Emergency Preparedness website for additional information:
http://www.purdue.edu/ehps/emergency_preparedness/index.html

Diversity & Inclusion Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue's nondiscrimination policy can be found at: http://www.purdue.edu/purdue/ea_eou_statement.html.

Mental health Mental Health If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try Therapy Assistance Online (TAO), a web and app-based mental health resource available courtesy of Purdue Counseling and Psychological Services (CAPS). TAO is available to all students at any time by creating an account on the TAO Connect website, or downloading the app from the App Store or Google Play. It offers free, confidential well-being resources through a self-guided program informed by psychotherapy research and strategies that may aid in overcoming anxiety, depression and other concerns. It provides accessible and effective resources including short videos, brief exercises, and self-reflection tools.

If you need support and information about options and resources, please contact or see the Office of the Dean of Students. Call 765-494-1747. Hours of operation are M-F, 8 a.m.- 5 p.m.

If you find yourself struggling to find a healthy balance between

academics, social life, stress, etc., sign up for free one-on-one virtual or in-person sessions in West Lafayette with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is free and can be done on BoilerConnect. Students in Indianapolis will find support services curated on the Vice Provost for Student Life website.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 or http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or by going to the CAPS offices in West Lafayette or Indianapolis.

Accessibility

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

Homework submission requirements and guidelines

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Homework submission requirements

- Each problem must start on a new sheet of paper.
- The format for each problem must follow that which is provided on the following page. If you use multiple sheets of paper to solve a problem, repeat the *DATE*/*PROBLEM NO.*/*PAGE NO.* and *NAME* header on each sheet.
- Before scanning, put the pages for the two questions in order and scan from the first to the last sheet of paper.
- After scanning, the pages should be assigned to the correct questions within Gradescope.
- The homework submission is due by 11:59PM of the due date. DRC students who are permitted extra-time accommodations are able to submit homework by noon the next day without loss of points.
- Plan ahead in anticipation of possible technical hiccups in submitting. Plan to complete and submit your homework several hours before the due time. If technical issues prevent you from submitting by the due time, email this submission to the lead TA prior to the due time. Any submission arriving in Gradescope or to the lead TA *after* the due time will be counted as *LATE*, regardless of the reason.
- Your writing needs to be large enough so that when the problem is scanned, it does not require the grader to do high levels of magnification to be able to read your solution. You need to use a sharp pencil that is on the soft side (HB at a minimum) so that the writing is dark enough so that the scan works well.
- Before uploading to Gradescope, check the quality of the scanned problem. You do not want to lose points because the grader is unable to read your solution. If it is hard to read, you need to rescan and make sure the result is better.
- The correct vector notation in this course for homeworks, quizzes and exams is that using unit vectors; e.g., $\vec{F} = \left(10\hat{i} + 20\hat{j}\right) lb$. Do NOT use the "bracket notation" for vectors such as $\vec{F} = \langle 10,20 \rangle lb$. Usage of the bracket notion in your vector answers can lead to a loss in points.
- You must specify coordinate systems, associated references points, draw the unit vectors that you are using on the diagrams, and include units in your answers. For kinetics problems, you must include clear free-body diagrams. Failure to do any of these things will result in a loss of points. Failure to do all of these things will result in a large loss of points.

Homework grading

You will have two homework problems assigned per class period. One of the two assigned problems will be graded in detail, with a maximum of ten points per problem. The other assigned problem will be graded only for completion and not for correctness - four points will be awarded for a completed solution of this problem.

Homework format
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DUE DATE *(month, day, year)* ***PROBLEM NO.*** *(H#.#)* ***PAGE NO.*** *(# of #)* ***NAME*** *(last, first)*

***Given*:** A concise statement (in your own words) of the information given.

***Find*:** A concise statement (in your own words) of the information sought.

***Solution*:** **Sketch the system** to be studied. USE A STRAIGHT EDGE for drawing lines. Always draw in the UNIT VECTORS for the coordinate systems that you use in your solution.

For kinetics problems, follow the four-step plan:

1. Draw FBD's
2. Write down the fundamental kinetics equations (Newton/Euler, work/energy, linear impulse/momentum, angular impulse momentum equations)
3. Kinematics
4. Solve

Work the problem symbolically.
At the end convert all quantities to a consistent set of units and substitute into the equations to obtain the answers.

Check your answers for correctness and feasibility.

Check your vector notation and units. In particular, check that you are not equating vector quantities to scalar quantities. It is important that you demonstrate that you know the difference between scalars and vectors. So pay attention to your notation.

Label the answers._____ANSWER

ME 274 – Course Blog

Spring 2026

The blog discussion threads for this course are intended to provide a forum for the exchange of ideas among the students in the class and between the students and the instructor. From this blog, you can get/provide assistance from/to other people in the class. We have found that you can often learn as much from helping others as from getting help for yourself.

REWARD:

To reward your involvement in the blog, up to *40 BONUS points* to your homework/quiz score is available based on the following:

> *Asking questions and providing assistance to others.* For this, you ask/answer questions of others on a comment or post. A minimum of six quality comments will count as full credit toward your blog point bonus. *Only blog activity prior to the last day of class will count toward your blog participation reward.*

Your total combined HW/Quizzes/Bonus points will not exceed 25% of your final grade.

ANONYMITY IN POSTING:

When you first log onto the course blog and are approved by your instructor, your default *User Name* is set to that of your Purdue Career Account. This *User Name* will appear with each comment that you post on the blog. If you would like to post anonymously, you are able to choose a new "*Nickname*" that will be displayed instead of your *User Name* on the comments. To do so:

1. Go to your "**Edit my profile**" in the upper right of the Admin Bar under "**Howdy**".
2. Add a nickname in the "**Nickname**" (*required*)" box.
3. In the "**Display name publicly as**", choose the desired nickname from the drop-down list.
4. Click "**Update Profile**" at the bottom of the page.

You may add additional *Nicknames*, and switch among these for different displays throughout the semester. If being anonymous to your colleagues is important to you for your postings, choose nicknames that will help you maintain your anonymity.

Some common questions at the start of the semester

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Are homeworks and quizzes very important in the course?

To do well in this course, problem-solving practice (i.e., doing your homework and quizzes) is essential. 25% of your final grade in the course comes from your homework assignments and quizzes.

Where can I find the homework assignments?

The homework will be posted on the course website: www.purdue.edu/freeform/me274

Where can I get help with homework?

The course website can be used 24/7 for any questions regarding the course. Homework assistance is also available in the ME 274 tutorial room and instructor office hours. Staffed hours of operation will be announced in class.

What is the appropriate homework format?

Homework must be submitted in the correct format, as shown on the attached sheet in this handout. In particular, you must include statements of "Given" and "Find", and your sketch of the problem, when a figure is supplied in the problem statement.

How do I submit the homework?

Homework will be submitted via Gradescope and is due at 11:59 PM on the day of the next regular class period after it is assigned. Homework is to be submitted as a scan or by direct electronic inking on a tablet. The submission format must be a *SINGLE* PDF file. Do not submit image files such as JPEG, PNG, TIFF, etc. You may use your mobile device to make a PDF scan the homework, e.g., with the scanning functionality of Dropbox, or apps such as Camscan or Scannable.

Is late homework accepted?

No homework submitted after the due date/time will be accepted.

How is each homework set graded?

Each homework set consists of two problems and has a maximum possible grade of 10. One of the two problems is chosen on each set for grading.

How can I review homework problem solutions?

A video solution for each homework problem assigned will be posted on the course website soon after the "late" due date for the assignment. Solution videos for all homework problems submitted prior to an exam will be available prior to the exam date.

What is the format of the quizzes?

Quizzes will not be announced. The specific quiz policy for your course section will be explained by the instructors during class.

How do I keep up in the course?

In order to succeed in this course, you need to be engaged in the course every class period. Attend every class. Ask questions. Complete all assignments. If for some reason you need to miss a session of the class, review the activities of the day on the "Daily Schedule" page on the course website.

Course Schedule – Spring 2026

ME 274 - BASIC MECHANICS II

School of Mechanical Engineering - Purdue University

PERIOD		DATE	TOPIC	READ	HWK
			KINEMATICS		
1	M	1/12	Point Kinematics – Cartesian, Path and Polar/Cylindrical	1.A	H.1.A, H.1.B
2	W	1/14	Point Kinematics – Cartesian, Path and Polar/Cylindrical	1.A	H.1.C, H.1.D
3	F	1/16	Point Kinematics – Cartesian, Path and Polar/Cylindrical	1.A	H.1.E, H1.F
	M	1/19	***No class due to University holiday***		
4	W	1/21	Point Kinematics – Joint Descriptions	1.C	H.1.G, H.1.H
5	F	1/23	Point Kinematics – Relative and Constrained Motion	1.D	H.1.I, H.1.J
6	M	1/26	Planar Kinematics – Rigid Bodies	2.A	H.2.A, H.2.B
7	W	1/28	Planar Kinematics – Rigid Bodies	2.A	H.2.C, H.2.D
8	F	1/30	Planar Kinematics – Rigid Bodies	2.A	H.2.E, H.2.F
9	M	2/2	Planar Kinematics – Instant Centers	2.B	H.2.G, H.2.H
10	W	2/4	Planar Kinematics – Summary	2.C	H.2.I, H.2.J
11	F	2/6	Moving Reference Frame Kinematics – 2D	3.A	H.3.A, H.3.B
12	M	2/9	Moving Reference Frame Kinematics – 2D	3.A	H.3.C, H.3.D
	W	2/11	Moving Reference Frame Kinematics – 3D	3.B	H.3.E, H.3.F
	Th	2/12	***Exam 1, 8:00–9:30 PM, Locations TBA***		
13	F	2/13	***No class due to evening exam***		
14	M	2/16	Moving Reference Frame Kinematics – 3D	3.B	H.3.G, H.3.H
15	W	2/18	Moving Reference Frame Kinematics – 3D	3.B	H.3.I, H.3.J
			KINETICS		
16	F	2/20	Particle Kinetics – Newton's Second Law	4.A	H.4.A, H.4.B
17	M	2/23	Particle Kinetics – Newton's Second Law	4.A	H.4.C, H.4.D
18	W	2/25	Particle Kinetics – Newton's Second Law	4.A	H.4.E, H.4.F
19	F	2/27	Particle Kinetics – Work/Energy	4.B	H.4.G, H.4.H
20	M	3/2	Particle Kinetics – Work/Energy	4.B	H.4.I, H.4.J
21	W	3/4	Particle Kinetics – Linear Impulse/Momentum	4.C	H.4.K, H.4.L
22	F	3/6	Particle Kinetics – Linear Impulse/Momentum	4.C	H.4.M, H.4.N
23	M	3/9	Particle Kinetics – Central Impact	4.C	H.4.O, H.4.P
24	W	3/11	Particle Kinetics – Angular Impulse/Momentum	4.D	H.4.Q, H.4.R
25	F	3/13	Particle Kinetics – Angular Impulse/Momentum	4.D	H.4.S, H.4.T
			Spring Break - no classes		
26	M	3/23	Particle Kinetics – Summary	4.A-D	H.4.U, H.4.V
27	W	3/25	Planar Kinetics of Rigid Bodies – Newton/Euler Equations	5.A	H.5.A, H.5.B
28	F	3/27	Planar Kinetics of Rigid Bodies – Newton/Euler Equations	5.A	H.5.C, H.5.D
29	M	3/30	Planar Kinetics of Rigid Bodies – Newton/Euler Equations	5.A	H.5.E, H.5.F
	W	4/1	Planar Kinetics of Rigid Bodies – Work/Energy	5.B	H.5.G, H.5.H
	Th	4/2	***Exam 2, 8:00–9:30 PM, Locations TBA***		
30	F	4/3	***No class due to evening exam***		
31	M	4/6	Planar Kinetics of Rigid Bodies – Work/Energy	5.B	H.5.I, H.5.J
32	W	4/8	Planar Kinetics of Rigid Bodies – Impulse/Momentum	5.C	H.5.K, H.5.L
33	F	4/10	Planar Kinetics of Rigid Bodies – Impulse/Momentum	5.C	H.5.M, H.5.N
34	M	4/13	Planar Kinetics of Rigid Bodies – Summary	5.A-D	H.5.O, H.5.P
			VIBRATIONS		
35	W	4/15	Vibrations – Equations of Motion	6.A	H.6.A, H.6.B
36	F	4/17	Vibrations – Free, Undamped Response	6.B	H.6.C, H.6.D
37	M	4/20	Vibrations – Free, Damped Response	6.B	H.6.E, H.6.F
38	W	4/22	Vibrations – Free, Damped Response	6.B	H.6.G, H.6.H
39	F	4/24	Vibrations – Harmonic Excitation	6.C	H.6.I*, H.6.J*
40	M	4/27	Vibrations – Harmonic Excitation	6.C	H.6.K**, H.6.L**
41	W	4/29	Vibrations – Harmonic Excitation	6.C	H.6.M**, H.6.N**
42	F	5/1	Course Overview		

Homeworks are due on Gradescope at 11:59pm of the day of the next regular class period.

* ***Due at 11:59PM on Sunday, 4/26***

** ***Will not be collected***