Syracuse University

ECS 222: Dynamics

Syllabus – Spring 2025

Instructor
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Teaching Assistant
TBA
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Email TBA

Welcome![1]

Hello and welcome to ECS 222: Dynamics. I firmly believe that success in this class is a team effort. Your part is to stay engaged, put in consistent effort, and speak up when you need clarification or support. My part is to guide you, answer your questions, and help you find studying strategies that work for you. If something isn't clicking, let me know during class or during my dedicated student hours. Let's make this a productive and enjoyable learning experience for everyone.

Course Overview

	Time	Location
Class	MW 1245 – 1405	Life Science Building 011
Recitation M003	W 0800 – 0855	Hall of Languages 105
Recitation M004	W 1140 – 1235	Life Sciences Building 214
Student Hours[2]	MW 0930 – 1030	Link Hall 367
TA Office Hours	TBD	TBD
Final Exam	05/06/25 0800 – 1000	Heroy Geology Building 113

Course Description

Catalog description: Dynamics of a particle. Newton's law and D'Alembert's principle. Plane motion. Cartesian, polar, and local coordinates. Energy and momentum methods. Motion of a rigid body. Review of vector algebra and moments of inertia.

Class description[3]: This course is about understanding and predicting how things move. We'll start by looking at the motion of a single particle and build up to the movement of entire rigid bodies like cars, airplanes, and satellites. Along the way, we'll use Newton's laws, energy and momentum ideas, and different coordinates to describe motion. We'll also review the math tools you need, like vector algebra and moments of inertia, so you can tackle problems with confidence. By the end of the course, you will be prepared to model and interpret the motion of a wide range of engineering systems.

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[1] Included a welcome statement that lets students know that the course will be a team effort.
[2] Changed the name of office hours to student hours to emphasize my availability.
[3] Included a layman class description to complement the catalog description.

Prerequisites by Topic
To succeed in this course, you[4] will need the knowledge and skills you already acquired in these previous courses:

- Calculus II (MAT296)
- Statics (ECS221)

Course Learning Objectives and Shared Competencies
This course fosters one Shared Competency, Syracuse University's university-wide learning goals for undergraduate students:

- Critical and Creative Thinking

This course also focuses on one ABET Student Outcome:

- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Therefore, at the completion of the course, you should be able to[5]:

- Describe 2D kinematics of particles/rigid bodies.
- Draw free body diagrams for particles/rigid bodies, and their components to perform kinetic analysis.
- Relate forces and accelerations acting on particles/rigid bodies to derive the equations of motion for planar motion.
- Develop equations of motion for mechanical systems connected by a variety of different methods, including pinned, spring, and rolling conditions among others.
- Understand and use energy methods to solve dynamic problems.

Course Delivery Format
This course is an in-person course. Lectures and other course activities will not be recorded. Lectures will begin promptly at the scheduled time. If you arrive late, please enter as quietly as possible to minimize disruption.

Academic Excellence Workshops (AEW) [6]
Extra support for this course by the department is available. I work closely with the AEW facilitators to ensure that their review sessions are aligned with our class and your assignments. Interested students should enroll in this OPTIONAL one-credit class, ECS 202 - AEW for Dynamics, via MySlice. Any questions about registration for the AEW program can be directed to aewreg@syr.edu.

Course Materials and Technologies

[4] Used first person language throughout.
[5] I am looking into changing these but need departmental approvement first.
[6] Included opportunities for extra support.

Textbook
Beer F.P., Johnston E.R., Cornwell P.J., and Self B. P., Vector Mechanics for Engineers: Dynamics 2024 Release, McGraw Hill, 2024, ISBN-13: 9781266709197

Blackboard
This class will use the Blackboard Learning Management to house the syllabus, course content, links to external course materials, assignments, quizzes, exams, feedback, and grades. Note when submitting materials that the University's Blackboard Learning Management System is on Eastern Time.

Information about Blackboard is available on Answers Blackboard; alternatively, you can contact Information Technology Services by sending an email to help@syr.edu, calling 315.443.2677, or in-person at the ITS Service Center, located at 1-227 CST in the Life Sciences Complex. Business hours for the Service Center can be found on the ITS Website at http://its.syr.edu/its_service_center/

Assessment

Your grade will be calculated based on the following assessments. Our assignments are design to help you learn and practice the skills needed to succeed in the course. For every topic, we will start with assignments that have high levels of directedness and support (in-class practice, recitation). As you learn and practice more, you will start working more independently (homework, midterms).[7] For every step, I have listed the level of independence and where you can get help from.

	Percentage	Who[8]	Get help from [9]
In-Class Practice	5%	Collaborative in class	Instructor, classmates, lecture notes, textbook
Recitation	10%	Small groups	TA, small group, lecture notes, textbook
Homework	20%	Can work together but individual submission	Instructor, TA, AEW, classmates, lecture notes, textbook
Photo Assignments	10%	Individual	Friends and classmates
Midterms (3)	35%	Individual	Cheat sheet
Final Exam	20%	Individual	Cheat sheet

Grading Scale

100-94 A	93-90 A-	89-87 B+	86-84 B	83-80 B-
79-77 C+	76-74 C	73-70 C-	69-60 D	< 60 F

[7] Organized the description of the assignments in the direction of scaffolding.
[8] Included level of collaboration to promote academic integrity.
[9] Included helpful resources to promote asking for help as well as academic integrity.

In-Class Practice[10]
All topics will start with some practice in class. First, I will walk you through the concepts, equations, and process of solving the problem. Then, we will work on a problem as a class. You will submit a short description of how the problem was solved at the end of class.

Recitations
Recitations will generally be used for you to practice setting up additional example problems in the form of worksheets that illustrate the key concepts from the previous lectures. You will receive some problems and work with a small group to set them up. Then the TA will walk you through the correct process and you will self-grade your work[11]. Your grade will be based on your reflection of your own work.

Homework
Homework assignments are designed as individual practice to increase your mastery of the course topics. This shouldn't discourage you from discussing your process with other students, but keep in mind that submissions should be individual. All homework must be submitted on Blackboard as single PDF files. Homework assignments are due at 6:00 pm on the due date (Fridays), but when life gets in the way, accommodation can be made. If accommodation is necessary, contact me by 5:00 pm on the day of the submission and you will receive a 3-day extension[12]. Unexcused late submissions will not be accepted for credit but will still get feedback.

Photo Assignments [13]
A big goal for this class is for you to start seeing engineering in everyday life. For each module covered, you will have take a picture of an everyday object, event, or situation that pertains to the topic at hand. Each picture should be accompanied by a short description of the phenomena.

Examinations
There will be three midterms and one final exam in this course. Combined, these exams are worth 55% of the overall grade. Exams are an opportunity for you to showcase your mastery of the material as an individual. I have not scheduled make-up exams, but if there are extenuating circumstances, please contact me as soon as possible.

Grade Dispute Policy
If your score on an assignment was miscalculated based on written feedback, please notify me via email and attach the graded paper for corrections to be made. Grade disputes will always be managed by me and any disputes brought to the TA will be dismissed. If you have concerns

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[10] Included descriptions for each of the assessment types.
[11] Included some self-reflection through self-grading to facilitate the metacognitive process for the students.
[12] This is a lenient late-work policy but since homework is due on Friday and I don't grade work over the weekend, this doesn't create more work for me. I also set an intentional deadline at the end of working hours so there is a boundary between work and home life.
[13] Included a new way of allowing students to engage with the topics of the course outside of class.

about or disagree with a grade that was given to you on any coursework, these concerns will be dealt with on a case-by-case basis after consideration.

You must make a request for a grade review within one (1) week of the return of the graded work; otherwise, the grade stands as is. You may not request a review after this period, unless under extenuating circumstances. To request a review, you must email me within one (1) week of the return of the graded work. Note: a request for review could result in a lower grade.

Course Schedule

Week	Date	Topic	Assignment
1	01/13 M	Syllabus Review and Introduction to Dynamics	
	01/15 W	Rectilinear Motion	
2	01/20 M	**MLK DAY – NO CLASS**	
	01/22 W	Rectilinear Motion	01/24 F HW #1
3	01/27 M	Curvilinear Motion	01/27 Photo #1
	01/29 W	Curvilinear Motion	
4	02/03 M	Curvilinear Motion	
	02/05 W	Curvilinear Motion	02/07 F HW #2
5	02/10 M	Kinetics of Particles: Newton's 2nd Law	02/10 Photo #2
	02/12 W	Kinetics of Particles: Newton's 2nd Law	
6	02/17 M	**Midterm #1**	
	02/19 W	Kinetics of Particles: Energy and Momentum	02/21 F HW #3
7	02/24 M	Kinetics of Particles: Energy and Momentum	
	02/26 W	Systems of Particles	02/26 Photo #3
8	03/03 M	Kinematics of Rigid Bodies	
	03/05 W	Kinematics of Rigid Bodies	03/07 F HW #4
9	03/10 M	**SPRING BREAK – NO CLASS**	
	03/12 W		
10	03/17 M	Kinematics of Rigid Bodies	
	03/19 W	**Midterm #2**	
11	03/24 M	Kinematics of Rigid Bodies	
	03/26 W	Kinematics of Rigid Bodies	03/28 F HW #5
12	03/31 M	Plane Motion of Rigid Bodies: Forces and Accelerations	03/31 Photo #4
	04/02 W	Plane Motion of Rigid Bodies: Forces and Accelerations	
13	04/07 M	Plane Motion of Rigid Bodies: Forces and Accelerations	
	04/09 W	Plane Motion of Rigid Bodies: Energy and Momentum Methods	04/11 F HW #6
14	04/14 M	Plane Motion of Rigid Bodies: Energy and Momentum Methods	

Week	Date	Topic	Assignment
	04/16 W[14]		04/16 Photo #5
15	04/21 M	**Midterm # 3**	
	04/23 W	3D Motion of Rigid Bodies	04/25 F HW #7
16	04/28 M	Course Review	

*The schedule is subject to change. Check Blackboard for the most up-to-date schedule.

Academic Integrity

As a pre-eminent and inclusive student-focused research institution, Syracuse University considers academic integrity at the forefront of learning, serving as a core value and guiding pillar of education. Syracuse University's Academic Integrity Policy provides students with the necessary guidelines to complete academic work with integrity throughout their studies. Students are required to uphold both course-specific and university-wide academic integrity expectations such as crediting your sources, doing your own work, communicating honestly, and supporting academic integrity. The full Syracuse University Academic Integrity Policy can be found by visiting class.syr.edu, selecting, "Academic Integrity," and "Expectations and Policy."

Upholding Academic Integrity includes the protection of faculty's intellectual property. Students should not upload, distribute, or share instructors' course materials, including presentations, assignments, exams, or other evaluative materials without permission. Using websites that charge fees or require uploading of course material (e.g., Chegg, Course Hero) to obtain exam solutions or assignments completed by others, which are then presented as your own violates academic integrity expectations in this course and may be classified as a Level 3 violation. All academic integrity expectations that apply to in-person assignments, quizzes, and exams also apply online.

Students found in violation of the policy are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered. Students may not drop or withdraw from courses in which they face a suspected violation. Any established violation in this course may result in course failure regardless of violation level.

Generative AI

Based on the assignments in this course and our specified learning outcomes, the full use of artificial intelligence as a tool, with disclosure and citation, is permitted in this course. Students do not need to ask permission to use these tools before starting an assignment or exam, but they must explicitly and fully indicate which tools were used and describe how they were used.

Any use of AI should be prefaced by a declaration of acknowledgement. The declaration must follow this structure:[15]

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[14] Left this day empty in case we fell behind with the course materials. This gives me some breathing room and helps with my overall mental health.

[15] Included an AI declaration to promote academic integrity.

I acknowledge the use of [AI tool or technology name] to generate [description]. I entered the following prompt(s): [include prompts]. I used the output to [description].

Other Course Policies

Academic Drop Deadline

As part of our efforts to track satisfactory academic progress, the Academic Drop Deadline and the Financial Drop deadline will both occur on February 3rd, 2025. Students may still withdraw from courses after these deadlines; this would place a 'WD' grade on their transcripts. Students enrolled in "flex" classes (Flexibly formatted classes) have different deadlines and will need to check MySlice for the Academic and Financial Drop deadlines that pertain to their class.

University Attendance Policy

Attendance in classes is expected in all courses at Syracuse University. Students are expected to arrive on campus in time to attend the first meeting of all classes for which they are registered. Students who do not attend classes starting with the first scheduled meeting may be academically withdrawn as not making progress toward a degree by failure to attend. It is a federal requirement that students who do not attend or cease to attend a class be reported at the time of determination by the faculty.

Disability Accommodations

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. I invite any student to contact me to discuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Center for Disability Resources (CDR) in this process.

If you would like to discuss disability-accommodations or register with CDR, please visit Center for Disability Resources. Please call (315) 443-4498 or email disabilityresources@syr.edu for more detailed information.

The CDR is responsible for coordinating disability-related academic accommodations and will work with the student to develop an access plan. Since academic accommodations may require early planning and generally are not provided retroactively, please contact CDR as soon as possible to begin this process.

Discrimination or Harassment

The University does not discriminate and prohibits harassment or discrimination related to any protected category including creed, ethnicity, citizenship, sexual orientation, national origin, sex, gender, pregnancy, disability, marital status, age, race, color, veteran status, military status, religion, sexual orientation, domestic violence status, genetic information, gender identity, gender expression or perceived gender.

Any complaint of discrimination or harassment related to any of these protected bases should be reported to Sheila Johnson-Willis, the University's Chief Equal Opportunity & Title IX Officer. She is responsible for coordinating compliance efforts under various laws including Titles VI, VII, IX and Section 504 of the Rehabilitation Act. She can be contacted at Equal Opportunity, Inclusion, and Resolution Services, 005 Steele Hall, Syracuse University, Syracuse, NY 13244-1120; by email: titleix@syr.edu; or by telephone: 315-443-0211.

Faith Tradition Observances

Syracuse University's Religious Observances Policy recognizes the diversity of faiths represented in the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their traditions. Under the policy, students are given an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance, provided they notify their instructors no later than the academic drop deadline. For observances occurring before the drop deadline, notification is required at least two academic days in advance. Students may enter their observances in MySlice under Student Services/Enrollment/My Religious Observances/Add a Notification.

Mental Health

Mental health and overall well-being are significant predictors of academic success. As such it is essential that during your college experience you develop the skills and resources effectively to navigate stress, anxiety, depression, and other mental health concerns. Please familiarize yourself with the range of resources the Barnes Center provides (https://ese.syr.edu/bewell/) and seek out support for mental health concerns as needed. Counseling services are available 24/7, 365 days, at 315-443-8000.