EGN 3321 - Dynamics

Spring 2026

- **Instructor**
  - Dr. Eric C. Havenhill

    Office: BARC 1189

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    Email: ehavenhill@floridapoly.edu

    Office Hours:

    Section 2: T TH 8 - 9 am

    Section 3: T TH 9:30 - 10:50 am
- **Grader**
  - TBD

    Office: TBD

    Email: TBD

    Office Hours: TBD
- **Course Specifics**

  Lecture times

  Section 2: T TH 11 am - 12:15 pm

  Section 3: T TH 4 - 5:15 pm

  Location

  Section 2: IST 1015

  Section 3: IST 1014

  Credit hours: 3, Lecture hours: 3, Lab hours: 0

  General Eduction / Gordon Rule: No / No

  Full-Term, Spring 2026
- **Prerequisite(s) / Corequisite(s)**

  Prerequisites: EGN 3311 Statics, MAC 2313 Analytic Geometry and Calculus 2

  Communication/Computation Skills Requirement (6A-10.030): No

  The passing letter grade for this course is a "C" or better.
- **Course Description**

  Study of the motion of particles and rigid bodies applying the vector approach. Topics include motion of a particle; motion of a rigid body; relative motion; kinetics of translation, rotation, and plane motion; work-energy methods; impulse-momentum.
- **Course Objectives**

  Dynamics provides an exploration into the branch of mechanics that involves the accelerated motion of particles and rigid bodies. The subject of dynamics will be presented in two parts:

  1. kinematics, which examines the geometric aspects of motion
  2. kinetics, which explores the analysis of the forces causing motion

  Dynamics extends the prior study of Statics by incorporating the motion of a body with the forces acting on it for analysis. In Dynamics, students will learn to apply Newton's laws of motion to engineering problems. Additionally, students will learn to analytically solve engineering problems where force, work, energy, impulse, and momentum impact the accelerated motion of particles and rigid bodies.

- **Course Learning Outcomes & Alignment with Program Outcomes**

Course Learning Outcome	**Learning Level (Bloom's/ABET Assessment Example)**	**Program Learning Outcome (ABET 1-7)**
Leverage vector analysis techniques to examine the motion of accelerated particles and rigid bodies.	**Knowledge:** Ability to recall previously learned material. **Application:** Ability to use learned material in new situations. **ABET Assessment:** Homework, in-class evaluations, and group activities.	An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science, and math. (ABET 1)
Apply Newton's laws of motion to accelerating particles and rigid bodies.	**Knowledge:** Ability to recall previously learned material. **Application:** Ability to use learned material in new situations. **ABET Assessment:** Homework, in-class evaluations, and group activities.	An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science, and math. (ABET 1)
Analyze engineering systems using principles of kinetics and kinematics.	**Knowledge:** Ability to recall previously learned material. **Application:** Ability to use learned material in new situations. **ABET Assessment:** Homework, in-class evaluations, and group activities.	An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science, and math. (ABET 1)
Integrate force, work, energy, impulse, and momentum analysis methods with vector analysis techniques to solve complex engineering problems.	**Synthesis:** Combination of prior knowledge for new applications. **Application:** Synthesize knowledge on assessments to solve complex problems **ABET Assessment:** in-class evaluations, Exams.	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (ABET 7)
Describe the planar motion of rigid bodies using equilibrium equations and kinematic constraints.	**Knowledge:** Ability to recall previously learned material. **Application:** Ability to use learned material in new situations. **ABET Assessment:** Homework, in-class evaluations, and group activities.	An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science, and math. (ABET 1)
Implement a professional analysis format that is transferrable to other topics in engineering.	**Analysis:** Decomposing material into constituent parts so they can be examined and understood. **Application:** Standardize format for all work and assessments. **ABET Assessment:** Homework, in-class evaluations, and group activities.	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. (ABET 4)

- **Textbook, Instructional, and Required Material**

  Textbook: Engineering Mechanics: Dynamics, 15th Edition, 2021, Russell C. Hibbeler

  Other Materials: Canvas, Computer or Tablet, Microsoft Teams, Scientific or Engineering Calculator, Florida Poly Email Address

  Note: Only calculator models approved for use on the Fundamentals of Engineering (FE) Exam will be allowed in this course:

  * Casio: All fx-115 and fx-991 models
  * Hewlett Packard: The HP 33s and HP 35s models, but no others
  * Texas Instruments: All TI-30X and TI-36X models

- **Attendance**
  - Students are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor" (University Policy, FPU-5.0010AP). It is the student's responsibility to give the instructor notice prior to any anticipated absence and within a reasonable period after an unanticipated absence, ordinarily by the next scheduled class meeting.
- **Participation**
  - Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.
- **Email Policy**

  Florida Polytechnic University email is the official method of communication for the University. Students are required to check their Florida Poly e-mail frequently.

  Emails must be sent from your Florida Poly email account to the Florida Poly email address of the instructor (ehavenhill@floridapoly.edu). **The instructor will NOT respond to messages sent through Canvas.** Please allow up to 36 hours on weekdays for a response, after which a student may send a follow-up email. Emails must be composed in a professional manner with a greeting, signature, and in an organized fashion. Start the subject line with "[EGN 3321]" for a quicker response time.
- **Evaluation**
  - **Homework Sets (30%):** There will be a total of (tentative) 10 homework sets. Hand-written (on paper or with stylus) homework solutions must be submitted electronically through Canvas as a single PDF. Students' hand-written work must follow the provided format, be legible, and all figures should be drawn with a straight edge, otherwise they will not be graded. Each homework set will be due about 1 week from when the homework set was assigned.
  - **Conceptual Quizzes (10%):** There will be a total of (tentative) 6 concept evaluations. These evaluations are tentatively planned to be given at the start of the lecture and will cover fundamental topics from the previous few lectures.
  - **Exams (60%):** Exam 1, Exam 2, and Exam 3 will each be worth 20% of your grade for a total of 60%. The first exam will cover topics from chapter 12 through chapter 13 of the textbook. The second exam will cover chapter 14 through chapter 16. The third exam will cover topics from chapter 17 through chapter 19. On Exam 3, the instructor may add material from chapters 12 through 16 if necessary for assessment. All exams will be closed-notes and closed-book.
  - **Bonus Assignments:** There may be additional opportunities throughout the semester by completing supplementary activities assigned by the instructor. These will be available at the instructor's discretion. Individual requests for additional assignments to improve a students' overall grade in the course will not be granted.

Activity	**Percentage**
Homework Sets	30
Conceptual Quizzes	10
Exam 1	20
Exam 2	20
Exam 3	20
Total	100

- **Grading Scale**
  - Scores will be rounded up to the nearest integer for the final grade.
  - Grades for each assignment will be posted to Canvas and students should make sure they are recorded correctly. However, there is no guarantee that the percentages or projected grades provided there are correct.
  - The instructor will calculate final percentages and will determine final grades regardless of Canvas calculations.

Grade	Percentage
A	100 - 93
A-	92 - 90
B+	89 - 86
B	85 - 83
B-	82 - 80
C+	79 - 76
C	75 - 70
D	69 - 60
F	59 - 0

- **Re-Grade Requests**
  - A re-grade request can be made by a student that feels an exam was graded incorrectly. To complete the request, a student must submit a written explanation for why they believe an exam should be re-graded (1/2 to 1 page written). The request must be made no later than 1 week after receiving a grade for the exam. A re-grade request consists of the instructor re-grading the ENTIRE exam.
- **Late Work/Make-up Work**
  - Homework assignments may be submitted up to two days late, with a 10% grade penalty per day. No make-up options will be provided for in-class quizzes, expect for documented health or university related circumstances. Make-up opportunities will only be granted for exams in exceptional circumstances and at the discretion of the professor. Students are expected to reach out to the instructor well in advance of an exam or provide a valid justification if doing so ahead of time is not possible.
- **University Policies**
  - Academic Integrity: All students must commit to the highest ethical standards in completion of all academic pursuits and endeavors. Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students: Academic Integrity
  - Reasonable Accommodations: Students who qualify for course or classroom adjustments under the Americans with Disabilities Act (ADA) must register with the Office of Disability Services: Request for Disability Services
  - The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments (Accommodations for Religious Observances, Practices and Beliefs).
  - Title IX: Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sexual misconduct, including discrimination based on sex or gender, harassment, stalking, sexual assault, sexual exploitation, or intimate partner violence. If you or someone you know needs assistance, you may speak to any university employee; however, they have an obligation to report the incident to the Title IX Coordinator, who will keep that information private to the greatest extent possible. If you want to speak to someone permitted to keep your disclosure confidential, seek assistance from the Florida Polytechnic University Ombudsman, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-412-2700 (24-hour hotline) or 863-412-2708 to schedule an appointment. If you or someone you know feels unsafe or may be in imminent danger, please call the Florida Polytechnic University Police Department 863-874-8472 or the local Police Department 911 immediately. For more information about policy, reporting options and resources at Florida Polytechnic University and the community, please visit the Title IX Website.
  - Recording Lectures: Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Recording

class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is **prohibited**.

- **Academic Support Resources**

  Students can access the Florida Polytechnic University Library through the student portal and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.

  Tutoring and Learning Center: The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. The TLC is located in the IST Commons (second floor).

  Knack Tutoring: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com.

  Academic Success Coaches: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.

  Writing Center: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit floridapoly.edu/writingcenter.

- **Course Schedule**

Week	Day	Date	Topic	Chapter	Due
1	T	Jan. 13	Introduction	N/A	
	R	Jan. 15	Kinematics of a Particle	12.1 - 12.2	
2	T	Jan. 20	Rectilinear Kinematics	12.1 - 12.2	
	R	Jan. 22	Curvilinear Motion - Rectangular	12.4 - 12.5	Homework 1
3	T	Jan. 27	Projectile Motion	12.6	Concept Quiz 1
	R	Jan. 29	Curvilinear Motion – N&T	12.7	Homework 2
4	T	Feb. 3	Relative Motion of a Particle	12.9 - 12.10	
	R	Feb. 5	Newton's 2nd - Rectangular	13.10 - 13.4	Homework 3
5	T	Feb. 10	Career Day - No Classes		Concept Quiz 2
	R	Feb. 12	Newton's 2nd - N&T, Polar	13.5, 13.6	Homework 4
6	T	Feb. 17	Buffer Day / Exam Review		
	R	Feb. 19	Exam 1 (Tentative)		
7	T	Feb. 24	Work, Energy, Power, & Efficiency	14.1 - 14.5	Feedback Form
	R	Feb. 26	Conservation of Energy	14.6	
8	T	Mar. 3	Linear Impulse & Momentum	15.1 - 15.3	Concept Quiz 3
	R	Mar. 5	Impact	15.4	Homework 5
9	T	Mar. 10	Angular Momentum	5.5	
	R	Mar. 12	Kinematics of a Rigid Body	16.1 - 16.3	Homework 6
10	T	Mar. 17	Spring Break - No Classes		
	R	Mar. 19	Spring Break - No Classes		
11	T	Mar. 24	Relative Motion of a Rigid Body	16.5	Homework 7
	R	Mar. 26	Instantaneous Center	16.6	Concept Quiz 4
12	T	Mar. 31	Buffer Day / Exam Review		
	R	Apr. 2	Exam 2 (Tentative)		
13	T	Apr. 7	Rigid Body Kinetics	17.1 - 17.3	Concept Quiz 5
	R	Apr. 9	Rotation About a Fixed Axis	17.4	
14	T	Apr. 14	General Plane Motion	17.5	Homework 8
	R	Apr. 16	Rigid Body Work & Energy	18.1 - 18.4	
15	T	Apr. 21	Conservation of Energy	18.5	Concept Quiz 6
	R	Apr. 23	Linear & Angular Momentum	19.1 - 19.3	Homework 9
16	T	Apr. 28	Conservation of Momentum	19.3	
	R	Apr. 30	Reading Day – No Lecture		Homework 10
17	M-F	Finals	Exam 3 (TBD)		

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. This schedule is subject to change without notice. - Dr. Eric C. Havenhill