Glendale Community College

Engineering Department

ENGR 230 Dynamics 4-Units

Course Syllabus Spring 2024 (C-ID ENGR 230)

Instructor Contact Information

- **Professor Christopher Herwerth,**
  - **MS Mechanical Engineering**
  - **BS Mechanical Engineering**
  - **CA Professional Engineer, License No. M 34433**
- **GCC Email: cherwerth@glendale.edu**
- **Phone: 1-818-240-1000 ext. 5628**
- **Course Meeting Time: Online and Asynchronous**
- **Online Office Hours: Mon, Thurs and Fridays 3 PM to 4:45 PM**
  - I will be holding online Synchronous Office Hours every **starting Wednesday February 21 through Canvas "Chat or Zoom".** This means, I will be online providing instant feedback during this time.
  - If students cannot make these hours and would like to talk another time, they may request an appointment to chat by sending me a message through CANVAS or email cherwerth@glendale.edu.
  - Students may also message me any questions and allow 24 hours for a response.
  - Inquiries sent on Fridays may not be returned until the following Monday.
  - There are also Q&A discussion forums where other students may help answer questions before I get there to do so.
  - Students are strongly advised to exchange contact information, as peer-to-peer discussion about technical content is frequently a highly successful learning activity.

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Course Description

ENGR 230 covers the fundamentals of kinematics and kinetics of particles and rigid bodies. Topics include kinematics of particle motion; Newton's second law, work-energy and momentum methods; kinematics of planar motions of rigid bodies; work-energy and momentum principles for rigid body motion as well as an introduction to mechanical vibrations.

Prerequisites: ENGR 152 Engineering Mechanics - Statics

UC and CSU Transferable

About This Class

- This course is considered an Online, asynchronous course: We will not meet on-campus for any reason, but you must log into the class via Canvas to participate in course activities. Attendance means that students participate in the course on a weekly basis by taking quizzes, uploading assignments, reading course material and participating in course discussions and advancing through the course material.
- This 16-week, asynchronous course officially starts Tuesday February 20 and ends Wednesday June 12.
- Students must log into CANVAS during the first week of this Asynchronous class and complete two assignments: 1. the Icebreaker discussion (self-introduction) and 2. the syllabus quiz, **both before Sunday February 25 11:59 PM**
- Students who **do not** log in and complete both the Icebreaker Discussion and Syllabus Quiz, will **be dropped from the course by the following Thursday 11:59 pm.**
- **Students adding the class late have until the Census deadline (Drop deadline) to complete the check in assignments.**
- Syllabus Quiz: Click on the syllabus assignment **after** carefully reading the course syllabus and follow the steps to answer the questions of the quiz.
- For more information on course drops, See Refund/Payment Policy: https://www.glendale.edu/home/showdocument?id=25858 REFUND/REPAYMENT POLICY A. Refund Policy for All Students - glendale.edu
- Below are a few resources for students about what it means to drop a class:
  - It's okay to drop a class, really! (Links to an external site.)

- Should I Drop a Class? (Links to an external site.)
- To Drop or Not to Drop?

Browser Compatibility:

Use the most recent version of your browser to make sure everything works correctly in Canvas. Check Glendale Online Help page for Distance Education.

Student Learning Outcomes

At the conclusion of the course, students will be able to:

1. sketch free-body diagrams and kinetic diagrams by isolating rigid bodies and vectorially solve two-dimensional and three-dimensional kinematics and dynamics problems;
2. apply Newton's second law to drive and analyze the equations of motion of a particle, a system of particles and a rigid body in motion;
3. employ the conservation of work and energy laws in mechanics to solve dynamics problems, as an alternative method to Newton's laws of motion.

Textbook(s) and Required Materials

Engineering Mechanics - Dynamics, R.C. Hibbeler, 14th Edition 2016 (15th Edition is acceptable), Pearson

ISBN 9780133915389

Additional Resources that are acceptable

J.L. Meriam, and L.G. Kraige and J.N. Bolton, Engineering Mechanics Dynamics 8th edition, Wiley, 2015.

ISBN-13: 978-1-118-88584-0

(Older editions are acceptable)

Beer and Johnston, Vector Mechanics for Engineers - Dynamics

Alternative Textbook Source **https://www.redshelf.com/**

- Please let me know right away if any materials are not accessible in this course and I will ensure access in a timely matter.

- [Glendale Community College Bookstore Website]

Course Communication

Email

If you ever have any questions, please email me through Canvas by clicking on "Inbox" on the left side of your homepage. Click on "Compose a new message", select this course and then select "Teachers" under the "To" field and you will find my name, **Christopher Herwerth.** This is email inside Canvas :-) I am not supposed to receive any personal email...Canvas email only, please! **I will respond to your email within 24 hours, M-F.** If you do not hear back from me within this time, please assume I did not receive your email and resend it.

Course Assignments

Important Dates

The due dates for your assignments can be found in the *Calendar* in the **global navigation links at the top of your screen**. Please review these. In addition, I will post reminders prior to the due dates in the *Announcements*.

Weekly Assignments

Each week you will need to complete the following:

- Read/Watch the daily lessons. This will be available every **Monday.**
- Take the **quizzes** available two weeks before **the specified due date, typically Mondays 11:59 PM**
- Complete the **assignments** in each course lesson by **Mondays 11:59 pm (14 days after assigned)**
- **Assignment Formatting: All assignments shall have a formal structure with Given, Find, Assumptions, Sketch, Free Body Diagram, Plan/Solution, and Unit Check with Boxed Answers. See Canvas Page "Assignment Formatting" for additional details. Assignments submitted without the formal structure will be docked 50% with no re-submission allowed.**

Grading

Assignments	40%
Quizzes	30%
Final Exam	30%

Extra Credit 5%

A 90 - 100

B 80 - 89

C 70 - 79

D 60 - 69

*Grading breakdowns are approximate. Your grade may be rounded up with professor's judgement of level of effort and understanding. ***Doing your own work and asking questions*** **are highly valuable. The Professor is here to help.**

Notes on Grading Items:

Assignments: There will about **40 assignments** given worth approximately 1 point each. Typically, each assignment will be one or two problems to solve. Most of these will require an explanation written in your own handwriting that demonstrates that you understand the problem. All assignments are open resource, and you are encouraged to form study groups to solve them. **(40%)**

Quizzes: There will be weekly **quizzes** including the Check in Syllabus Quiz. Quizzes will be fairly easy but they must be completed on time as there will be no make-up quizzes given. The Syllabus Quiz will be due on Sunday February 27th and subsequent quizzes will be due by 11:59 of the first day of the week; usually Mondays except for any holidays which would set the quiz due date back by one day; Tues. **(30%)**

Final Exam: The final exam will be a take home exam and like the assignments or possibly a real-world project you will be required to explain each problem solution. **(30%)**

Extra Credit: All students are encouraged to meet with the instructor for teleconferences via Zoom. You may earn up to 5 points extra credit for verbally demonstrating knowledge of the course content. The meeting may involve the instructor asking technical questions about a specific topic or you may give a presentation of something of interest in the course. An example might be a discussion or explanation of how to solve a truss problem using method of sections. **(5% maximum, usually one point for each discussion)**

Verbal discussions with the instructor do not supersede the course syllabus. Late work is not accepted. Canvas is for feedback and communication. Grades are based on the weighted categories in this syllabus, not necessarily what Canvas calculates.

Students missing assignments do not have to explain the reason for missed deadlines. You do not have to disclose personal hardships or medical information to the instructor. Extra credit is available to make for lost points.

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Rubric

Engineering Problem Solving Rubric				
Criteria	**Ratings**			**Pts**
Problem Set-up Problem is clearly organized with Given, Find, Assumptions, Equations, Solution section with Unit Check or Alternate Solution. Includes all relevant information. A sketch and/or free-body diagram are drawn.	**35 pts** **Full Marks** The problem solution contains all necessary and significant structure and set-up information.	**20 pts** **Partial Marks** The solution contains some but not all necessary structure and information or may be missing a diagram or stated requirement.	**0 pts** **No Marks** The solution does not contain any structure of information for the set up of the problem.	35 pts
Calculation and Answers Problem solution contains step by step calculations that are neat and easily read. The answer is clearly circled or boxed and a unit check or alternate solution calculation is included.	**35 pts** **Full Marks** Full set of calculations are included with clearly marked answers with unit check or alternate solution of other check.	**20 pts** **Partial Marks** The solution is missing the unit check or alternate calculation or other checking method or the solution does not show sufficient calculation steps for understanding.	**0 pts** **No Marks** Little or no calculations are shown and no check of the answer is presented	35 pts
Discussion or description of the problem An explanation of the solution is included such as one or two sentences explaining what the answer means. Alternate solutions may be explained or the importance of the solution is included. Bulleted descriptions of the calculation steps are included in the calculation section in addition to the final discussion.	**30 pts** **Full Marks** There is a written explanation of the solution or other discussion of the importance or relevance of the calculations. One or two sentences is included and the explanation demonstrates understanding of the underlying	**15 pts** **Partial Marks** The discussion is limited or trivial. Explanation does not demonstrate a full understanding of the concepts.	**0 pts** **No Marks** No discussion or explanation is included at the end or throughout the problem solution.	30 pts

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Course Grades & Feedback

You can view your grades using the *Grades* button in the course navigation links. Please check your grades regularly to make certain that I have received all your assignments. If you have a question about a grade, email me through the Canvas *Inbox* (left-side of your screen). Please do not post your personal concerns in a discussion forum.

I will be using the Canvas grading tool for your discussions and written assignments. You can see not only your grades, but also comments and feedback as well.

Submission Policy

Plan for success! Submit your work by the requested due date and time. Late submissions are not accepted. If you have an extenuating circumstance, please contact me by private message before the assignment is due to make alternate arrangements.

Attendance/Participation/Refund Policies

- Students who do not complete the Syllabus Quiz and Check-in Discussion by Sunday February 27 will dropped from the course per CA state requirements on Distance Education.
- Participation/Attendance: Attendance for this Online course is defined as logging into the course in Canvas during the class meeting time and participating in the class activities. Participation for this class means completing and submitting work consistently each week.
    - Any student that is added as a 'late add' student has until Sunday March 7th 11:59 pm to complete the Check-In Assignment or be dropped.
    - Any student who misses two or more weeks of coursework may be dropped from the course.
- Students: Please refer to Student Rights in an Online and Hybrid Course (https://www.glendale.edu/class-schedule/distance-education/de-faculty-

center/student-rights-in-an-online-and-hybrid-course (Links to an external site.)) if you have further questions regarding the expectations from your course and instructor.

Additional Policies and Resources

Academic Honesty

It is expected that all work submitted for grading is original, not copied from others and that the work being graded is indeed done by the student who is receiving the grade. Cheating and plagiarism are serious violations of the student conduct code. Cheating or plagiarizing will result in a zero on the assignment or test and may result in other disciplinary action taken by the College. All incidents of cheating or plagiarizing are reported to the Dean of Students. For more information, please refer to the Glendale Community College Academic Honesty Policy.

Late Work

- There are weekly assignments and quizzes each week. Late work is not accepted. For extenuating circumstances, late work is only accepted at a 10% reduction *per day* late rate. For example, if your assignment is two calendar days late (ie due Feb 23rd 11:59 pm and student submits Feb 25th 3:15 pm , student can only earn a maximum of 80%.
- Late assignments will not be accepted on a continuous basis; meaning, if two assignments are submitted late at any time in the semester, the third will not be accepted and be counted as a missed assignment. Keep in mind, more than two weeks worth of assignments cannot be missed without being dropped from the course.

Students with Disabilities

- All students with disabilities seeking accommodations are responsible for making arrangements in a timely manner through the Center for Students with Disabilities. Please let me know right away if you will need accommodations so we can pre-plan together.
- Please let me know if you have adaptive software and hardware to assist you with taking this course or if you have any specific needs of which I should be aware. You can find more information about Disabled Students Programs and Services (DSPS) or call the office at 818-240-1000 x5905.
- Students with disabilities have the right to receive reasonable academic adjustments in order to create an educational environment where they have equal access to instruction without fundamentally altering any course,

educational program or degree. (GCC Board Policy, 2000)
Any student who feels they may need an accommodation based on the impact of a disability should contact Disabled Students Program and Services (DSP&S) at (818) 240-1000 ext. 5905 or visit the DSP&S office in the San Rafael Building, 2nd Floor.

Non-discrimination and Equal Opportunity Policy:

"Glendale Community College District is a multicultural community of people from diverse racial, ethnic, linguistic and class backgrounds, national origins, religious and political beliefs, physical and mental abilities, gender identities, and sexual orientations. The activities, programs, classes, workshops/lectures, and everyday interactions of this district are enriched by our acceptance of one another, and we strive to learn from each other in an atmosphere of positive engagement and mutual respect." Please see the Glendale College Catalog, page 19.

Harassment Policy:

"All forms of harassment are contrary to basic standards of conduct between individuals and are prohibited by state and federal law, as well as this policy, and will not be tolerated. The district is committed to providing an academic and work environment that respects the dignity of individuals and groups. The District shall be free of sexual harassment and all forms of sexual intimidation and exploitation including acts of sexual violence. It shall also be free of other unlawful harassment, including that which is based on any of the following statuses: race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, genetic information, marital status, sex, gender, gender identity, gender expression, age, or sexual orientation of any person, or because he or she is perceived to have one or more of the forgoing characteristics." Please refer to the Glendale College Catalog, page 19.

Student Technical Support

Go to the Student Tech Support page if you are having Canvas tech issues or check out the resources below:

- **Canvas Questions ONLY: 24/7 Assistance at 1-844-600-4951**
- **Student Support through Live Chat**
- **Student Support On-Campus (SM 266)**
- **Student Canvas Guides**
- **Student Distance Education Success Tips**

Student Online Services

There are many additional services to help you during this course. A few of these include:

- **Free Online Tutoring, which can be accessed through the website or through Canvas.**
- **GCC Library (Databases & Online Chat), which can be accessed through the website or through Canvas.**

Additional services can be found on the GCC Student Services Webpage.

Course Schedule (Tentative)

	ENGR 230 Dynamics Schedule Spring 2024		
	Tentative		
Week	**Topic**	**Sections**	**Assignment Problems**
Week 1	**Introduction and Chapter 12 Kinematics of Particles**		Assignment 1 Units
20-Feb	History and Applications of Dynamics	12.1	Assignment 2 Problems F12-2, F12-7, 12-21
	Units, Gravitation, Dimensions, Problem Solving Procedures		Assignment 3 Problems 12-29, 12-30
Week 2	**Chapter 12 Kinematics of Particles**		Assignment 4 Problems F12-13, 48, 55, 66
26-Feb	Rectilinear Kinematics: Continuous Motion, Erratic Motion	12.2 - 12.5	Assignment 5 Problems F12-23, F12-26, 72
	Plane Curvilinear Motion, Rectangular Coordinates		Assignment 6 Problems 94, 103
Week 3	**Chapter 12 Kinematics of Particles**		Assignment 7 Problems F12-27, 124, 129
4-Mar	Motion of a Projectile, Curvilinear Motion: Normal and Tangential	12.6 - 12.9	Assignment 8 Problems F12-34, 159, 164, 175
	Curvilinear Motion: Cylindrical Components		Assignment 9 Problems F12-43, 196, 213
	Absolute Dependent Motion of Two Particles: Relative Motion of Two Particles		Assignment 10 Problems F12-48, 228, 235
Week 4	**Chapter 13 Kinetics of a Particle: Force and Acceleration**		Assignment 11 Problems F13-5, 4, 19
11-Mar	Newton's Second Law of Motion, The Equation of Motion	13.1 - 13.4	Assignment 12 Problems 16, 33, 37
	Equation of Motion for System of Particles, Rectangular Coordinates		Assignment 13 Problems F13-9, 54
Week 5	**Chapter 13 Kinetics of a Particle: Force and Acceleration**		Assignment 14 Problems 70, 75
18-Mar	Equation of Motion: Normal and Trangential Coordinates	13.5 - 13.6	Assignment 15 Problems F13-13, 93
	Equations of Motion: Cylindrical Coordinates		Assignment 16 Problems 98, 104
Week 6	**Chapter 14 Kinetics of a Particle: Work and Energy**		Assignment 17 Problems F14-3, 15, 22, 26
25-Mar	Work of a Force, Principle of Work and Energy	14.1 - 14.3	Assignment 18 Problems F14-12,51, 55
	Power and Efficiency, Conservation of Energy	14.4 - 14.5	Assignment 19 Problems 85, 93
Week 7	**Chapter 15 Kinetics of a Particle: Impulse and Momentum**	15.1 - 15.2	Assignment 20 Problems F15-1, 8, 28, 33
1-Apr	Linear Impulse and Momentum, Conservation of Impulse and Momentum	15.3	Assignment 21 Problems 39, 40, 52
	Impact, Angular Momentum	15.4	Assignment 22 Problems F15-6, 67, 93
Week 8	**Chapter 15 Kinetics of a Particle: Impluse and Momentum**	15.5 - 15.7	Assignment 23 Problems F15-19, F15-21, 97
8-Apr	Principle of Angular Impulse and Momentum,		Assignment 24 Problems 100, 110
	Steady Flow of a Fluid Stream	15.8	Assignment 25 Problems 114, 115, 121

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Week 9			Extra Credit Problem 15-134
15-Apr	Spring Break		
Week 10	**Chapter 16 Planar Kinematics of a Rigid Body**	16.1 - 16.3	Assignment 26 Problems F16-6, 7, 13
22-Apr	Translation and Rotation about a Fixed Axis		Assignment 27 Problems 29, 23, 31
	Absolute Motion Analysis	16.4	Assignment 28 Problems 39, 45, 49
			Assignment 29 Problems 50, 52
Week 11	**Chapter 16 Planar Kinematics of a Rigid Body**	16.5	Assignment 30 Problems F16-7, F16-9, 58
29-Apr	Relative Motion Analysis: Velocity	16.6	Assignment 31 Problems 59, 66, 79
	Instantaneous Center of Zero Velocity		Assignment 32 Problems F16-13, F16-16, 87, 88
		16.7	Assignment 33 Problems 110, 111, 115, 116
Week 12	Relative Motion Analysis: Acceleration		
6-May	**Chapter 17 Planar Kinetics of a Rigid Body: Force and Acceleration**	17.1 - 17.3	Assignment 34 Problems F17-5, 43, 50, 52
	Mass Moment of Inertia, Planar Kinetic Equations of Motion		
	Equations of Motion: Translation		
Week 13	**Chapter 17 Planar Kinetics of a Rigid Body: Force and Acceleration**	17.4	Assignment 35 Problems F17-9, 66, 85
13-May	Rotation about a Fixed Axis		Assignment 36 Problems F17-14, F17-17, 91, 92
	General Plane Motion	17.5	Assignment 37 Problems 98, 112, 116
Week 14	**Chapter 18 Planar Kinetics of a Rigid Body: Work and Energy**		Assignment 38 Problems F18-3, 10, 14
20-May	Work and Energy, Kinetic Energy, Work of a Force and Couple Moment	18.1- 18-4	Assignment 39 Problems 19, 27, 35
	Conservation of Energy	18.5	Assignment 40 Problems F18-8, F18-11, 39, 49
			Assignment 41 Problems 54, 57, 68
Week 15	**Chapter 19 Planar Kinetics of a Rigid Body: Impulse and Momentum**		
27-May	Principle of Impulse and Momentum, Linear and Angular Momentum	19.1 - 19.2	Assignment 42 Problems 5, 10, 24
	Conservation of Momentum	19.3	Assignment 43 Problems 29, 41
Week 16	**Chapter 22 Vibrations**		Extra Credit Problem 19-49
3-Jun	Undamped Free Vibrations, Energy Methods	22.1	Assignment 44 Problems 4, 9, 13
	Damped Free Vibrations		Assignment 45 Problems 17, 23, 25
Finals			Extra Credit Problems 22-41 and 22-48
6-Jun	**Final Exam Week (6-Jun to 12-Jun)**		**Final Exam Due Friday Jun 12 by 11:59 PM**
Note	Chapter numbers continue from Hibbeler Statics text, Chapter 12 is first		