Modesto Junior College

Course Outline of Record Report

11/17/2021

PHYS101 : General Physics: Mechanics

General Information

Faculty Author:	• Kenneth Meidl • Gervin, Dennis • Nomof, Thomas • Richmond, Jennifer • Chase, Daniel
Attachments:	Physics Batch DE Spring 2021.pdf Physics Curriculum 2015.pdf PHYS-101_SU16.pdf PHYS_101_CCC000524695.pdf DE Addendum EFF 5.2.16.pdf CID PHYS 205.pdf ASSIST CAS PHYS 101.pdf Download
Course Code (CB01) :	PHYS101
Course Title (CB02) :	General Physics: Mechanics
Department:	Physics
Proposal Start Date:	MJC Fall 2023
TOP Code (CB03) :	(1902.00) Physics, General
CIP Code:	(40.0801) Physics, General
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	No
Course Control Number (CB00) :	CCC000164387
Curriculum Committee Approval Date:	04/14/2015
Board of Trustees Approval Date:	05/13/2015
External Review Approval Date:	01/01/2015
Course Description:	Introduction to calculus-based physics. A course in classical mechanics exploring measurement, kinematics of one and two dimensional motions; Newton's laws of motion; circular motion; work and energy; linear and angular momentum; rotational kinematics and dynamics; statics and gravitation. PHYS 165 prerequisite may be met with proof of satisfactory completion of a high school physics course and completion of the petition process (Please visit the Science, Mathematics, and Engineering Division Office-SCC room 134-for the necessary form for this process).
Proposal Type:	Mandatory Revision Mandatory five-year review and revision.
Faculty Author:	• Nomof, Thomas

- Richmond, Jennifer
- Chase, Daniel

Discipline(s)

Master Discipline Preferred:
- Physics/Astronomy

Bachelors or Associates Discipline Preferred: No value

Course Coding

Basic Skill Status (CB08)

Course is not a basic skills course.

Course Special Class Status (CB13)

Course is not a special class.

Grading

- A-F or P/NP

☐ Allow Students to Gain Credit by Exam/Challenge

Repeatability

0

Course Prior To College Level (CB21)

Not applicable.

Rationale For Credit By Exam/Challenge

No value

Type of Repeat

No value

☐ Allow Students To Audit Course

Course Support Course Status (CB26)

Course is not a support course

Associated Programs

☑ Course is part of a program (CB24)

Associated Program	Award Type	Active

Chemistry for Transfer Degree (In Development)	AS-T Associate of Science for Transfer	MJC Fall 2021
Engineering (In Development)	A.S. Degree	MJC Fall 2023
Chemistry	A.S. Univ Prep - Area of Emphasis	MJC Summer 2020 to MJC Summer 2021
Chemistry for Transfer Degree	AS-T Associate of Science for Transfer	MJC Summer 2020
Computer Science for Transfer Degree	AS-T Associate of Science for Transfer	MJC Summer 2020 to MJC Fall 2021
CSU General Education Pattern	Certificate of Achievement	MJC Summer 2020 to MJC Summer 2021
General Studies: Emphasis in Natural Sciences	A.A. Degree	MJC Summer 2020
IGETC Pattern	Certificate of Achievement	MJC Summer 2020 to MJC Summer 2021
Mathematics for Transfer Degree	AS-T Associate of Science for Transfer	MJC Summer 2020 to MJC Spring 2021
MJC-GE Pattern	MJC-GE Pattern	MJC Summer 2020 to MJC Summer 2021
Physics for Transfer Degree	AS-T Associate of Science for Transfer	MJC Summer 2020 to MJC Fall 2021
Elementary Teacher Education for Transfer Degree (In Development)	AA-T Associate of Arts for Transfer	MJC Summer 2022

Transferability & Gen. Ed. Options

Course General Education Status (CB25)

Y

Transferability	Transferability Status
Transferable to both UC and CSU	Approved

MJC General Education (MJC-GE)	Categories	Status	Approval Date	Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable.
Area A: Natural Sciences	(MJC-GE:A)	Approved	No value	No Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable. defined.

CSU General Education Breadth Pattern (CSU-GE)	Categories	Status	Approval Date	Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable.
Area B1:Physical Sciences	(CSU-GE:B1)	Approved	No value	No Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable. defined.
Area B3: Laboratory Activity	(CSU-GE:B3)	Approved	No value	

Intersegmental General Education Transfer Curriculum (IGETC) (for CSU and UC)	Categories	Status	Approval Date	Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable.
Area 5A: Physical Sciences	(IGETC: 5A)	Approved	No value	No Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable. defined.
Area 5C: Laboratory Activity	(IGETC: 5C)	Approved	No value	

C-ID: California's Course Identification Numbering System	Categories	Status	Approval Date	Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable.
Physics (PHYS)	(PHYS)	Approved	No value	C-ID: PHYS 205 C-ID: PHYS 101 + PHYS 102 + PHYS 103= C-ID PHYS 200S

YCCD Intra-district Equivalencies	Categories	Status	Approval Date	Rationale (include Comparable Course, C-ID Descriptor, etc. if applicable.
Columbia College Equivalent Course	(CC)	Approved	No value	CC: PHYCS 5A

Field Trips

Field trips are required.

- (●) Yes
- ( ) No
- ( ) Maybe

Comparable Lower-Division Courses at UC/CSU v2

Courses numbered 100-299 require identification two comparable lower-division courses from CSU or UC from the current institutional catalog (not schedule). At least one course from CSU, and if requesting/maintaining UC general elective transfer, one course from UC. Please identify the CSU campus offering this course. (Term type is indicated in parentheses)

CPSU, San Luis Obispo (QTR)

CSU Catalog Year

2020-2021

Provide the CSU course code (e.g., ENGL 1A) from the most current official Catalog (not schedule). Curriculum changes each year.

PHYS 141

CSU Course Title

General Physics 1A

Does course-to-course or lower-division, "major prep" articulation with this course exist for this academic year?

Yes

Select the institution that offers the second comparable course from CSU or UC. If seeking or maintaining UC transferability, you must supply a UC campus. (Term type is indicated in parentheses)

UC Berkeley (SEM)

CSU/UC Catalog Year

2020-2021

Provide the CSU course code (e.g., ENGL 1A) from the most current official Catalog (not schedule). Curriculum changes each year.

PHYS 7A

CSU Course Title

Physics for Scientists and Engineers

Does course-to-course or lower-division, "major prep" articulation with this course exist for this academic year?

Yes

Select the institution that offers the third comparable course from CSU or UC. If seeking or maintaining UC transferability, you must supply a UC campus if not already provided above. (Term type is indicated in parentheses)

No Value

CSU/UC Catalog Year

No Value

Provide the CSU/UC course code (e.g., ENGL 1A) from the current official Catalog (not schedule). Curriculum changes each year.

No Value

CSU Course Title

No Value

Does course-to-course or lower-division, "major prep" articulation with this course exist for this academic year?

No Value

Units and Hours

Summary

Minimum Credit Units (CB07)	4
Maximum Credit Units (CB06)	4
Total Course In-Class (Contact) Hours	108
Total Course Out-of-Class Hours	108
Total Student Learning Hours	216

Credit / Non-Credit Options

Course Credit Status (CB04)

Credit - Degree Applicable

Course Non Credit Category (CB22)

Credit Course.

Non-Credit Characteristic

No Value

Course Classification Code (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Classs
Lecture Hours	3	6
Laboratory Hours	3	0
Activity Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	52.5
Course In-Class (Contact) Hours	
Lecture	54
Laboratory	54
Activity	0
Total	108
Course Out-of-Class Hours	
Lecture	108
Laboratory	0
Activity	0
Total	108

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class

No Value	No Value	No Value	No Value

Prerequisites, Corequisites, and Advisories

Prerequisite

MATH171 - Calculus: First Course

Or qualification by the MJC placement process.

Prerequisite

PHYS165 - Introductory Physics (in-development)

Advisory

PHYS121 - Problem Solving and Technology for Physics 101 (in-development)

Requisite Skills

Requisite Skills	Description
Identify and apply the vocabulary, formalisms and basic concepts of mechanics, wave motion, thermodynamics, and electricity.	• PHYS 165 - Identify and apply the vocabulary, formalisms and basic concepts of selected topics in mechanics, wave motion, thermodynamics, electricity and magnetism. • PHYS 165 - Identify, compare and use the techniques of quantitative measurement in the topics noted above. • PHYS 165 - Apply several methods of problem solving using conceptual, analytical and experimental techniques. • PHYS 165 - Apply several methods of problem solving using conceptual, analytical and experimental techniques. • PHYS 165 - Evaluate data within the context of the physics concepts.
Identify and apply the vocabulary, formalisms and basic concepts of mechanics, wave motion, thermodynamics, and electricity. LAB	• PHYS 165 - Use the scientific method in designing simple experiments to test a physical concept.
Demonstrate the proper operation of laboratory equipment. LAB	• PHYS 165 - Demonstrate the proper use of laboratory instruments in making measurements.
Demonstrate graphical techniques of displaying and analyzing experimental data.	• PHYS 165 - Demonstrate graphical techniques of displaying and analyzing experimental data.

State the definition of the derivative of a function and use the definition to calculate derivatives.	• MATH 171 - represent functions symbolically, numerically, and graphically, and use functions to model real-world situations. • MATH 171 - state the definition of the derivative of a function, use the definition to calculate derivatives, and use the derivative to find the equation of a tangent line to a function. • MATH 171 - calculate derivatives using the power, sum, difference, product, quotient, and chain rules. • MATH 171 - state and correctly use the derivatives of trigonometric, inverse trigonometric, exponential, logarithmic, and hyperbolic functions.
Calculate derivatives using the sum, difference, product, quotient laws, and the chain rule.	• MATH 171 - calculate derivatives using the power, sum, difference, product, quotient, and chain rules.
Use the derivative to sketch graphs, to solve maximum-minimum problems, motion problems, and related rate problems.	• MATH 171 - use derivatives to sketch graphs of functions. • MATH 171 - use derivatives to solve maximum-minimum problems, motion problems, and related rates problems.
Apply the integral to solve problems, including motion problems, work problems, fluid pressure problems, and area and volume problems.	• MATH 171 - apply the integral to solve problems involving motion, work, area, and volume.
Define the translational kinematic variables (time, distance, position, average speed, instantaneous speed, average velocity, instantaneous velocity, average acceleration and instantaneous acceleration) as well as apply them in order to explain, analyze, and solve one-dimensional motion problems.	• PHYS 121 - Define the translational kinematic variables (time, distance, position, average speed, instantaneous speed, average velocity, instantaneous velocity, average acceleration and instantaneous acceleration) as well as apply them in order to explain, analyze, and solve one-dimensional motion problems.
Use the rules of vector algebra to add vectors, subtract vectors, resolve vectors into components, multiply vectors by scalars and multiply vectors by other vectors using both the scalar product and vector product operations.	• PHYS 121 - Use the rules of vector algebra to add vectors, subtract vectors, resolve vectors into components, multiply vectors by scalars and multiply vectors by other vectors using both the scalar product and vector product operations.

Specifications

Methods of Instruction

Methods of Instruction (Typical)	INSTRUCTIONAL METHODS
MOI	1. Lectures 2. Class demonstrations

3. Classroom exercises
4. Instructor supervised hands-on laboratory activities
5. Modeling of problem-solving strategies through interactive discussion sessions

Assignments (Typical)

Evidence of Workload for Course Units (Quantity)

1. Weekly homework assignments to include textbook reading and problem solving related to concepts discussed in lecture/textbook
2. Weekly laboratory report
3. Studying for weekly homework quizzes, midterms and final exam

Evidence of Critical Thinking (Quality)

1. Example of Homework Problem: A skier starts from rest at the top of 37 degree incline that is 80 m long. (i) Using Newton's Laws of motion, determine the skier's speed at the bottom of the incline if the effective coefficient of friction is 0.13. (ii) Compare and contrast your solution using Newton's Laws to the one you obtain using the Law of Conservation of Energy.
2. Example of Exam Question: A rock is thrown straight upwards at 15 m/s. (i) How long will it remain in the air? (ii) How high will it go? (iii) What is the rock's acceleration at the top of its rise?
3. Example of Laboratory Question: Two ropes are used to pull a sled across the snow. One rope is pulled with a force of 75 N while the other rope is pulled with a force of 125 N. The angle between the ropes is 42 degrees. (i) Determine the net force on the sled using the component method of vector addition. (ii) Using the graph paper provided, add these vectors using the graphical method. (iii) Examine your two solutions and evaluate the accuracy of each.

Methods of Evaluation (Typical)	Rationale
FORMATIVE EVALUATION	1. Short quizzes 2. Mid-semester exams 3. Laboratory reports and quizzes 4. Homework; assigned problems
SUMMATIVE EVALUATION	1. Final exam

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Serway, Raymond	Physics for Scientists and Engineers (10th Ed.)	Saunders College Publishing	2019	9781337553278

Other Instructional Materials

No Value

Textbook Exceptions and Supplementals

Title of Other Material

Description: Physics 101 Laboratory Manual Author: Instructor of Record Citation: MJC Duplicating - 2021

Who prepared or published this supplemental material?

The instructor of record.

Publish date

The current semester.

Are any of the textbook editions cited on this proposal considered "Classics" (typically with a publish date more than 5 years old)?

- [ ] Yes
- [x] No
- [ ] Unsure

If yes, explain why this older text is used in the course. Reasons should focus on content only.

No Value

Materials Fees v2

Is there a materials fee for this course?

No

Provide a cost breakdown for all items provided for a materials fee. Each item must become "tangible personal property" of student upon payment of the fee and completion of the course.

No Value

Explain how these materials are related to the Student Learning Objectives for the course.

No Value

Explain how the materials have continuing value outside the classroom.

No Value

Is the amount of the material the student receives commensurate with the fee paid AND with the amount of material necessary to achieve the Student Learning Objectives for the course AND provided as the district's actual cost?

No Value

If no is checked, explain why.

No Value

If the district is NOT the only source of these materials, explain why the students have to pay a fee to the district rather than supply the materials themselves. (Cost savings? Health/Safety? Consistency/Uniformity?)

No Value

Learning Outcomes and Objectives

Course Objectives

Define the translational kinematic variables (time, distance, position, average speed, instantaneous speed, average velocity, instantaneous velocity, average acceleration and instantaneous acceleration) as well as apply them in order to explain, analyze, and solve one-dimensional motion problems.
Define and apply concepts related to measurement to include units, systems of units, metric prefixes, standards, unit conversions, dimensional analysis, order of magnitude estimates and significant figures.
Derive, state, and apply the 4 kinematic equations of motion in order to solve one-dimensional motion problems, such as that of the falling body.
Analyze position-time, velocity-time and acceleration time graphs using the concepts of slope and area.
Use the rules of vector algebra to add vectors, subtract vectors, resolve vectors into components, multiply vectors by scalars and multiply vectors by other vectors using both the scalar product and vector product operations.
Use vectors in conjunction with kinematical concepts to describe special cases of two-dimensional motion (including projectile motion, uniform circular motion and non-uniform circular motion) and apply kinematical concepts in order to explain, analyze and solve problems concerning physical phenomena.
State Newton's Three Laws of Motion and apply them in order to explain physical phenomena and solve quantitative problems in dynamics.
Define and differentiate among the concepts of work and power (for both constant and variable forces); kinetic energy and potential energy; conservative and non-conservative force as well as apply these concepts in order to explain, analyze and solve problems concerning physical phenomena.
Apply the Work-Kinetic Energy Theorem and Law of Conservation of Energy to explain physical phenomena and to extract quantitative kinematical information from mechanical systems.
Derive the impulse-momentum theorem from Newton's 2nd Law and use it to explain, analyze and solve problems concerning physical phenomena.
Derive the law of conservation of linear momentum from Newton's 3rd Law and use it to explain, analyze and solve problems involving collisions and other physical phenomena.
Define and determine the center of mass for a system of particles and continuous mass distribution, and use the center of mass concept to simplify and solve motion problems.
Define the analogous kinematical variables, kinematical equations and linear transformations for rotational motion and use them to explain, analyze

and solve motion problems.

Calculate the rotational inertia for systems of point particles and continuous mass distributions and use the Parallel Axis Theorem to aid in calculations.

Define the concepts torque, work, kinetic energy, power and angular momentum in order to describe rotating systems.

Apply Newton's Second Law, the conservation of energy and the conservation of angular momentum in order to explain, analyze and solve problems in rotational dynamics.

State the equilibrium conditions for a rigid body and apply them in solving statics problems for various systems of rigid bodies.

State Newton's Law of Universal Gravitation and apply it in order to explain, analyze and solve problems related to physical phenomena.

State and apply Kepler's 3 laws in conjunction with of the Law of Conservation of Energy to analyze planetary and satellite motion.

Define the concept of a gravitational field and calculate the gravitational potential energy for a system of point particles.

Lab Objectives

Demonstrate the proper use of laboratory instruments in making measurements.

Record and analyze their measurements to the correct number of significant digits.

Use the scientific method in designing simple experiments to test a physical concept.

Apply the scientific method in collecting and analyzing data to form conclusions.

Use graphing techniques, statistics, and computer modeling in the analysis of data to determine the relationship between physical quantities.

CSLOs

Solve problems and predict outcomes for moving objects though application of kinematics, Newton's laws of motion and conservation laws (algebraic, trigonometric and calculus based principles will be utilized in the process).

Expected SLO Performance: 0.0

Physics PHYSICS, AS-T	Solve problems and predict outcomes in nature using physical laws.
ISLOs Core ISLOs	Students will develop critical and analytical thinking abilities, cultivate creative faculties that lead to innovative ideas, and employ pragmatic problem-solving skills. Students will be able to: Analyze differences and make connections among intellectual ideas, academic bodies of knowledge and disciplinary fields of study. Develop and expand upon innovative ideas by analyzing current evidence and praxis, employing historical and cultural knowledge, engaging in theoretical inquiry, and utilizing methods of rational inference. Utilize the scientific method and solve problems using qualitative and quantitative data. Demonstrate the ability to make well-considered aesthetic judgments.
	Students will develop skills that aid in lifelong personal growth and success in the workplace. Students will be able to: Identify and assess individual values, knowledge, skills, and abilities in order to set and achieve lifelong personal, educational, and professional goals. Practice decision-making that builds self-awareness, fosters self-reliance, and nourishes physical, mental, and social health. Apply skills of cooperation, collaboration, negotiation, and group decision-making. Exhibit quality judgment, dependability, and accountability while maintaining flexibility in an ever-changing world.
ISLOs GELO	Demonstrate proficiency in NATURAL SCIENCE by doing the following: Explaining how the scientific method is used to solve problems and escribing how scientific discoveries and theories affect human activities

Use the scientific method to collect and analyze data for moving objects. Expected SLO Performance: 0.0

Physics PHYSICS, AS-T	Use the Scientific Method to collect and analyze data in forming conclusions and to verify physical principles through measurement and experimentation.
ISLOs Core ISLOs	Students will develop skills that aid in lifelong personal growth and success in the workplace. Students will be able to: Identify and assess individual values, knowledge, skills, and abilities in order to set and achieve lifelong personal, educational, and professional goals. Practice decision-making that builds self-awareness, fosters self-reliance, and nourishes physical, mental, and social health. Apply skills of cooperation, collaboration, negotiation, and group decision-making. Exhibit quality judgment, dependability, and accountability while maintaining flexibility in an ever-changing world.
	Students will develop skills to effectively search for, critically evaluate, and utilize relevant information while demonstrating technological literacy. Students will be able to: Effectively access information and critically evaluate sources of information. Analyze, synthesize and apply information practically and ethically within personal, professional and academic contexts. Identify, utilize and evaluate the value of a variety of technologies relevant to academic and workplace settings.
ISLOs GELO	Demonstrate proficiency in NATURAL SCIENCE by doing the following: Explaining how the scientific method is used to solve problems and escribing how scientific discoveries and theories affect human activities

Verify physical principles in classical mechanics through measurement and experimentation. Expected SLO Performance: 0.0

ISLOs Core ISLOs	Students will develop skills to effectively search for, critically evaluate, and utilize relevant information while demonstrating technological literacy. Students will be able to: Effectively access information and critically evaluate sources of information. Analyze, synthesize and apply information practically and ethically within personal, professional and academic contexts. Identify, utilize and evaluate the value of a variety of technologies relevant to academic and workplace settings.
	Students will develop skills that aid in lifelong personal growth and success in the workplace. Students will be able to: Identify and assess individual values, knowledge, skills, and abilities in order to set and achieve lifelong personal, educational, and professional goals. Practice decision-making that builds self-awareness, fosters self-reliance, and nourishes physical, mental, and social health. Apply skills of cooperation, collaboration, negotiation, and group decision-making. Exhibit quality judgment, dependability, and accountability while maintaining flexibility in an ever-changing world.
Physics PHYSICS, AS-T	Use the Scientific Method to collect and analyze data in forming conclusions and to verify physical principles through measurement and experimentation.
ISLOs GELO	Demonstrate proficiency in NATURAL SCIENCE by doing the following: Explaining how the scientific method is used to solve problems and escribing how scientific discoveries and theories affect human activities

State and apply fundamental mechanical principles in order to explain phenomena in our everyday world (emphasis will be placed upon relevant phenomena in the field of engineering). Expected SLO Performance: 0.0

Physics PHYSICS, AS-T	State and apply physical concepts to explain phenomena encountered in our everyday world.
ISLOs Core ISLOs	Students will generate and develop capabilities for creative expression and effective communication. Students will be able to: Articulate ideas through written, spoken, and visual forms appropriately and effectively in relation to a given audience and social context. Utilize interpersonal and group communication skills, especially those that promote collaborative problem-solving, mutual understanding, and teamwork. Mindfully and respectfully listen to, engage with and formally respond to the ideas of others in meaningful ways. Plan, design, and produce creative forms of expression through music, speech, and the visual and performing arts.
	Students will develop skills that aid in lifelong personal growth and success in the workplace. Students will be able to: Identify and assess individual values, knowledge, skills, and abilities in order to set and achieve lifelong personal, educational, and professional goals. Practice decision-making that builds self-awareness, fosters self-reliance, and nourishes physical, mental, and social health. Apply skills of cooperation, collaboration, negotiation, and group decision-making. Exhibit quality judgment, dependability, and accountability while maintaining flexibility in an ever-changing world.
ISLOs GELO	Demonstrate proficiency in NATURAL SCIENCE by doing the following: Explaining how the scientific method is used to solve problems and escribing how scientific discoveries and theories affect human activities

Content

Course Content

1. Physics and Measurement
    1. Standards of Length, Mass, and Time
    2. Matter and Model Building
    3. Density and Atomic Mass
    4. Dimensional Analysis
    5. Conversion of Units
    6. Estimates and Order-of-Magnitude Calculations
    7. Significant Figures
2. Motion in One Dimension
    1. Position, Velocity, and Speed
    2. Instantaneous Velocity and Speed
    3. Acceleration
    4. Motion Diagrams
    5. One-Dimensional Motion with Constant Acceleration
    6. Freely Falling Objects
    7. Kinematic Equations Derived from Calculus – General Problem-Solving Strategy
3. Vectors
    1. Coordinate Systems
    2. Vector and Scalar Quantities
    3. Some Properties of Vectors
    4. Components of a Vector and Unit Vectors
4. Motion in Two Dimensions
    1. The Position, Velocity, and Acceleration Vectors
    2. Two-Dimensional Motion with Constant Acceleration
    3. Projectile Motion
    4. Uniform Circular Motion
    5. Tangential and Radial Acceleration
    6. Relative Velocity and Relative Acceleration
5. Circular Motion and Other Applications of Newton's Laws
    1. Newton's Second Law Applied to Uniform Circular Motion
    2. Nonuniform Circular Motion
    3. Motion in Accelerated Frames
    4. Motion in the Presence of Resistive Forces
    5. Numerical Modeling in Particle Dynamics
6. The Laws of Motion
    1. The Concept of Force
    2. Newton's First Law and Inertial Frames

    3. Mass
    4. Newton's Second Law
    5. The Gravitational Force and Weight
    6. Newton's Third Law
    7. Some Applications of Newton's Laws
    8. Forces of Friction
7. Energy and Energy Transfer
    1. Systems and Environments
    2. Work Done by a Constant Force
    3. The Scalar Product of Two Vectors
    4. Work Done by a Varying Force
    5. Kinetic Energy and the Work-Kinetic Energy Theorem
    6. The Nonisolated System-Conservation of Energy
    7. Situations Involving Kinetic Friction
    8. Power
    9. Energy and the Automobile
8. Potential Energy
    1. Potential Energy of a System
    2. The Isolated System – Conservation of Mechanical Energy
    3. Conservative and Nonconservative Forces
    4. Changes in Mechanical Energy for Nonconservative Forces
    5. Relationship Between Conservative Forces and Potential Energy
    6. Energy Diagrams and Equilibrium of a System
9. Linear Momentum and Collisions
    1. Linear Momentum and Its Conservation
    2. Impulse and Momentum
    3. Collisions in One Dimension
    4. Two-Dimensional Collisions
    5. The Center of Mass
    6. Motion of a System of Particles
    7. Rocket Propulsion
10. Rotation of a Rigid Object About a Fixed Axis
    1. Angular Position, Velocity, and Acceleration
    2. Rotational Kinematics: Rotational Motion with Constant Angular Acceleration
    3. Angular and Linear Quantities
    4. Rotational Kinetic Energy
    5. Calculation of Moments of Inertia
    6. Torque
    7. Relationship Between Torque and Angular Acceleration
    8. Work, Power, and Energy in Rotational Motion
    9. Rolling Motion of a Rigid Object
11. Angular Momentum
    1. The Vector Product and Torque
    2. Angular Momentum
    3. Angular Momentum of a Rotating Rigid Object
    4. Conservation of Angular Momentum
    5. The Motion of Gyroscopes and Tops
    6. Angular Momentum as a Fundamental Quantity
12. Static Equilibrium and Elasticity
    1. The Conditions for Equilibrium
    2. More on the Center of Gravity
    3. Examples of Rigid Objects in Static Equilibrium
    4. Elastic Properties of Solids
13. Universal Gravitation
    1. Newton's Law of Universal Gravitation
    2. Measuring the Gravitational Constant
    3. Free-Fall Acceleration and the Gravitational Force
    4. Kepler's Laws and the Motion of Planets
    5. The Gravitational Field
    6. Gravitational Potential Energy
    7. Energy Considerations in Planetary and Satellite Motion

Lab Content

1. Measurement
    1. Quantities, units, standards
    2. Significant figures
    3. Order of magnitude estimates
2. Kinematics
    1. Uniform motion
    2. Uniformly accelerated motion
    3. Projectile motion
    4. Uniform circular motion
3. Dynamics
    1. Newton's laws of motion
    2. Applications of Newton's Second Law
    3. Friction
4. Work and Energy
    1. Kinetic and potential energies
    2. Measuring work, power, and efficiencies of simple systems
    3. Conservation of mechanical energy
5. Momentum
    1. Impulse-momentum theorem
    2. Conservation of linear momentum
6. Rotational Motion
    1. Rotational kinematics
    2. Torque
    3. Rotational inertia
    4. Rotational equilibrium for rigid bodies
    5. Conservation of angular momentum

Recommended Course Content

Recommended Course Content

No Value

Recommended Lab Content

No Value

Distance Education (DE) Addendum

Is this course being proposed for Distance Education? If so, select Yes below from the list in the dropdown and complete the questions. If no, select No and skip all questions.

- Yes

Modality Type:

- Hybrid
- Online (ECO)

Methods of Instruction:

- Asynchronous Discussion
- Viewing and Listening to Videos
- Online Activities
- Written Assignments
- Reading Course Materials
- Collaborative Peer/Group Activities
- Interactive Activities
- On-campus Orientation Sessions (hybrid only)
- Quizzes, Exams, and Surveys
- Facilitated Discussions
- Synchronous Discussion

If Other is selected for Methods of Instruction, please describe:

No Value

Describe how the methods of instruction selected above will allow students to meet the course's learning outcomes:

The course information can be covered asynchronously through recorded videos with closed captioning or through synchronous lectures using video conference technology. The instructor will use the school's learning management system to administer written assignments, reading materials, discussions, class activities, and quizzes/exams for formative and summative assessment. Discussions may be used in the hybrid modality to provide non-traditional assignments that promote equity for students. Labs may take place on campus in a face-to-face setting or remotely using simulation software and/or materials that are checked out from the laboratory technician.

Describe how the methods selected will be presented in an accessible way (Title 5 §55206). For information about accessibility standards in online classes, see the OEI Rubric, Section D (Copy this link and paste in a separate browser to visit OEI Rubric: https://onlinenetworkofeducators.org/course-design-academy/online-course-rubric/)

Instructor created curriculum in the form of written assignments and evaluations will follow OEI guidelines for heading styles, lists, links and images. The campus learning management system accessibility checker Tool will be used when creating online content for students. Heading styles will be used to make navigation of material easy for students and accessible for screen readers. Lists will use the bullet tool instead of being developed manually, images will have robust captions, tables will be formatted according to accessibility, and hyperlinks will be defined properly. All videos will have closed captions that are high quality, consistent, and meet the needs of deaf and hard of hearing audiences. Lab simulations will have accessibility options.

Regular and Effective Contact (REC) Methods and Examples: Select the methods below that ensure regular effective contact (REC) will take place among students and among students and faculty (Title 5 §55204) by being initiated by the instructor, regular and frequent, and meaningful or of an academic nature. Select the methods of REC that may be used:

No Value

REC Among students: How will students interact with each other in the course? What methods will be used? Check all that apply.

- Discussion Boards
- Group Projects
- Peer Review

REC Among students and faculty: How will faculty interact with students in the course? What methods will be used? Check all that apply

- Announcements
- Assignment Feedback
- Email
- Video Conferencing Technology (e.g. Zoom, MS Teams, etc...)

- Office Hours
- The Online Course Syllabus

Other Methods of REC among students and among students and faculty. Please describe and provide example(s).

No Value

In hybrid or teleclass courses, describe what parts of the course are done face-to-face and what parts are done online.

Lectures will take place online. Labs may take place in either a face-to-face or online setting. Assessments may take place in either a face-to-face or online setting, but should take place in a face-to-face setting whenever possible.

Checkoff List

Does this proposal meet the five development criteria as stated in the CCCCO Program and Course Approval Handbook (PCAH)?

Yes

Are library resources needed for this course?

No library resources are needed for this course.

Do you have any special concerns/needs or comments? If yes, describe.

No Value

Have you included documentation, if necessary, by uploading file(s) in the Cover Info tab? For example, advisory committee meeting minutes, C-ID descriptor, etc.)

No documentation is necessary

If this is a new course, have you attached the completed class capacity form, with required approvals, and uploaded the file in the Cover Info tab?

No, this is not a new course

If you are requesting Distance Education, did you complete the DE addendum tab?

Yes

If requesting transferability, have you completed the comparable courses field?

Yes

Add any additional comments you want reviewers to read.

No Value