Modesto Junior College

Course Outline of Record Report

11/17/2021

PHYS143 : Electricity, Magnetism, Optics, Atomic and Nuclear Structure

General Information

Faculty Author:	• Kenneth Meidl • Nomof, Thomas • Chase, Daniel • Richmond, Jennifer
Attachments:	Physics Batch DE Spring 2021.pdf PHYS-143_SU16.pdf ASSIST CAS PHYS 143.pdf PHYS_143_CCC000524700.pdf DE Addendum.pdf Download
Course Code (CB01) :	PHYS143
Course Title (CB02) :	Electricity, Magnetism, Optics, Atomic and Nuclear Structure
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) :	CCC000460583
Curriculum Committee Approval Date:	04/14/2015
Board of Trustees Approval Date:	05/13/2015
External Review Approval Date:	01/01/2015
Course Description:	Continuation of PHYS 142, including electricity, magnetism, light and atomic structure.
Proposal Type:	Mandatory Revision
	Mandatory five-year review and revision.
Faculty Author:	No value

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
Biological Sciences	A.S. Degree	MJC Summer 2020 to MJC Summer 2021
CSU General Education Pattern	Certificate of Achievement	MJC Summer 2020 to MJC Summer 2021
General Studies: Emphasis in Natural	A.A. Degree	MJC Summer 2020

Sciences		
IGETC Pattern	Certificate of Achievement	MJC Summer 2020 to MJC Summer 2021
MJC-GE Pattern	MJC-GE Pattern	MJC Summer 2020 to MJC Summer 2021

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 100S C-ID: PHYS 110

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 4B

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)

CSU, Chico (SEM)

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 202B

CSU Course Title

General Physics II

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.

PHYSICS 8B

CSU Course Title

Introductory Physics

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

PHYS142 - Mechanics, Heat, & Waves (in-development)

Advisory

PHYS153 - Problem Solving and Technology for Physics 143 (in-development)

Requisite Skills

Requisite Skills	Description
Define and apply concepts related to measurement (including units systems of units metric prefixes standards unit conversions dimensional analysis order of magnitude estimates and significant figures).	• PHYS 142 - Define and apply concepts related to measurement (including units systems of units metric prefixes standards unit conversions dimensional analysis order of magnitude estimates and significant figures).
Define the translational kinematic variables (time distance position average speed instantaneous speed average velocity instantaneous velocity average acceleration and instantaneous acceleration) as well as	• PHYS 142 - 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.

apply them in order to explain analyze and solve one-dimensional motion problems.	
Apply graphical techniques and analytical techniques to solve one-dimensional motion problems.	• PHYS 142 - Apply graphical techniques and analytical techniques to solve one-dimensional motion problems.
Describe vector properties and 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 142 - Describe vector properties and 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.
State Newton's Three Laws of Motion and apply them in order to explain physical phenomena and solve quantitative problems in dynamics.	• PHYS 142 - State Newton's Three Laws of Motion and apply them in order to explain physical phenomena and solve quantitative problems in dynamics.
Apply the Work-Kinetic Energy Theorem and Law of Conservation of Energy to explain physical phenomena and to determine quantitative kinematical information about mechanical systems.	• PHYS 142 - Apply the Work-Kinetic Energy Theorem and Law of Conservation of Energy to explain physical phenomena and to determine quantitative kinematical information about mechanical systems.
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.	• PHYS 142 - 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.
Use energy considerations to describe reflection and transmission of waves at boundaries and to determine the power and intensity of various types of waves.	• PHYS 142 - Use energy considerations to describe reflection and transmission of waves at boundaries and to determine the power and intensity of various types of waves.
State and apply Coulomb's Law and the Law of Conservation of Charge in order to explain, analyze and solve problems in electrostatics.	• PHYS 153 - State and apply Coulomb's Law and the Law of Conservation of Charge in order to explain, analyze and solve problems in electrostatics.
Describe the concepts of electric DC and AC current, resistance and resistivity; describe their relationship to voltage via Ohm's Law; and apply these concepts in order to explain, analyze and solve problems in electrodynamics.	• PHYS 153 - Describe the concepts of electric DC and AC current, resistance and resistivity; describe their relationship to voltage via Ohm's Law; and apply these concepts in order to explain, analyze and solve problems in electrodynamics.

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 sections 6. Possible field trips

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: Monochromatic red light is incident on a double slit and the interference pattern is viewed on a screen some distance away. Explain how the fringe pattern would change if the red light source is replaced by a blue light source.
2. Example of a Test Question: Calculate the magnitude and direction of the force on an electron traveling at 3,600,000 m/s horizontally to the west in a vertically upward magnetic field of strength 1.3 tesla.
3. Example of Laboratory Question: Use the ray box in conjunction with a diverging lens. Trace the lens and the light rays. Can you measure the focal length of the lens directly? Why or why not? Compare your results with those in the textbook.

Methods of Evaluation (Typical)	Rationale
FORMATIVE EVALUATION	1. Quizzes 2. Periodic exams 3. Laboratory work and exam 4. Homework: assigned problems and exercises
SUMMATIVE EVALUATION	1. Final exam

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Giancoli, Douglas	Physics: Principles with Applications (7th Ed.)	Addison-Wesley	2019	032162592-7

Other Instructional Materials

No Value

Textbook Exceptions and Supplementals

Title of Other Material

Description: Laboratory Manual for Physics 143 Author: Instructor of Course Citation: Duplicating

Who prepared or published this supplemental material?

The instructor of record.

Publish date

That 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

Describe properties of electric charges and methods of charging objects.

State and apply Coulomb's Law and the Law of Conservation of Charge in order to explain, analyze and solve problems in electrostatics.

Define the concept of an electric field and a line of force and sketch field lines for simple charge distributions.

Define the concepts of electric potential, electric potential difference and electric potential energy and calculate these quantities for collections of point charges.

Define the concept of an equipotential surface, explain its relationship to electric field lines, and calculate the value of the electric field given the electric potential of a charge distribution.

Define capacitance, calculate the capacitance of various types of capacitors, and calculate the effective capacitance for arrangements of capacitors in series and parallel.

Define the concept of energy density and calculate the energy density of an electric field as well as the energy stored in a capacitor.

Describe properties of dielectrics and their effect upon capacitance from both a macroscopic and microscopic perspective.

Describe the concepts of electric DC and AC current, resistance and resistivity; describe their relationship to voltage via Ohm's Law; and apply these concepts in order to explain, analyze and solve problems in electrodynamics.

Describe simple sources of electric power and calculate the electric power generated in a circuit.

Apply reduction techniques and Kirchoff's Laws in analyzing DC circuits.

Describe causes and properties of magnetic fields in current-carrying wires and permanent magnets.
Describe forces and torques acting on charged particles moving in magnetic fields as well as common applications of technologies exploiting such forces.
Describe magnetic field configurations surrounding various current distributions.
State and apply Faraday's Law of Electromagnetic Induction in order to explain common technologies and to analyze problems related to various electromagnetic phenomena.
Describe Hertz's Experiment, properties of electromagnetic waves and explain how electromagnetic waves are produced.
Describe the nature of light using both wave and particle models and describe experiments to determine the speed of light.
Using the ray model for light, state and apply the Law of Rectilinear Reflection and Snell's Law of Refraction in explaining and analyzing optical phenomena, such as dispersion and total internal reflection.
Use analytical techniques as well as ray diagrams to describe images formed by reflecting and refracting surfaces.
Using the wave model for light, describe and apply interference conditions to analyze, explain and solve problems involving double slit interference, thin films, single slit diffraction and diffraction gratings.
Describe four processes of polarizing light (selective absorption, reflection, scattering and double refraction) and apply Brewster's Law and the Law of Malus in order to solve problems involving light polarization.
State the postulates of special relativity and explain and apply the consequences of these postulates (including relative simultaneity, time dilation, length contraction, twin paradox, relativistic velocity addition, relativistic linear momentum, relativistic energy and rest energy) in explaining phenomena and solving quantitative problems.
Describe experimental procedures and results supporting the quantum nature of radiation and matter, including Planck's Hypothesis, the Photoelectric Effect and the Compton Effect.
Explain the meaning of the wave-particle duality in nature and describe the wave properties of particles.
State the Heisenberg Uncertainty Principle and explain the role of probability in quantum mechanics.

Describe the Thomson, Rutherford, Bohr and quantum models of the atom and cite experimental evidence supporting/refuting these models where appropriate.

Describe nuclear properties and structure as well as nuclear processes.

Lab Objectives

Demonstrate the proper use of laboratory instruments in making measurements.

Record and analyze 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 electromagnetic, optical and modern physical systems through application of principles in classical electromagnetism, classical wave theory and modern physics, (algebraic and trigonometric principles will be utilized in the process).

Expected SLO Performance: 0.0

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 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.
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 electromagnetic, optical and modern physical systems.

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.
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 involving classical electromagnetism, classical wave theory and modern physics through measurement and experimentation.

Expected SLO Performance: 0.0

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
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.

State and apply fundamental electromagnetic, optical and modern physical principles in order to explain phenomena in our everyday world, (emphasis will be placed upon relevant phenomena in the fields of the life sciences).

Expected SLO Performance: 0.0

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 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.
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. Electric Charge and The Electric Field
    1. Conservation of charge
    2. Insulators and conductors
    3. Coulomb's Law
    4. Electric field lines
2. The Electric Potential and Capacitance
    1. Relation between electric fields and electric potential
    2. Equipotentials
    3. Capacitance
    4. Dielectrics
3. Electric Currents
    1. The battery
    2. Electric current
    3. Ohm's Law

    4. Electric power
    5. DC circuits
4. Magnetism
    1. Magnetic fields
    2. Sources of magnetic fields and Ampere's Law
    3. Forces on charged particles
5. Electromagnetic Induction
    1. Induced EMF
    2. Faraday's Law
    3. Lenz's Law
    4. Generators and transformers
6. Electromagnetic Waves
    1. Changing electric fields and create magnetic fields
    2. The electromagnetic spectrum
    3. Measuring the speed of light
7. Geometric Optics
    1. Ray model of light
    2. The law of reflection
    3. Index of refraction
    4. Snell's Law
    5. Thin lenses and mirrors
8. Wave Nature of Light
    1. Huygen's Principle
    2. Interference of light
    3. Dispersion
    4. Diffraction
    5. Polarization
9. Optical Instruments
    1. Telescopes
    2. Cameras
    3. The human eye
    4. Rayleigh criteria for resolution
10. Special Theory of Relativity
    1. Galilean relativity
    2. Einstein's postulates of special relativity
    3. Time dilation
    4. Length contraction
    5. Momentum and mass
    6. The ultimate speed
    7. Energy and mass
11. Early Quantum Theory
    1. The properties of the electron
    2. Planck's hypothesis
    3. The photoelectric effect
    4. Photon interactions
    5. Wave particle duality
    6. Wave nature of matter
    7. The Bohr model of hydrogen
12. Quantum Mechanics
    1. The wave function
    2. The Heisenberg uncertainty principle
    3. The periodic table of elements
    4. The atomic number
13. Nuclear Physics
    1. Structure of the nucleus
    2. Fundamental forces
    3. Binding energy
    4. Nuclear radiation
    5. Half life
    6. Radioactive dating
14. Nuclear Energy and Effects and Uses of Radiation
    1. Transmutations
    2. Nuclear fission
    3. Nuclear reactions and weapons
    4. Nuclear fusion

5. Fusion reactors and weapons

Lab Content

1. Electrostatics
    1. Methods of charging objects
    2. Law of Conservation of Charge
    3. Coulomb's Law
    4. Electric field mapping
2. Capacitors and Dielectrics
    1. Measuring capacitance
    2. Factors affecting capacitance of the parallel plate capacitor
    3. Measuring dielectric constants of materials
    4. Comparing various types of capacitors
    5. Charge and discharge of capacitors
    6. Electric energy storage
3. Simple Circuits
    1. Resistors in series and parallel
    2. Capacitors in series and parallel
    3. Compound circuits
    4. Ohm's Law
    5. Making electrical measurements of current, voltage and resistance
4. Magnetism
    1. Magnetism in matter
    2. Sources of magnetic fields
    3. Mapping magnetic fields
    4. Measuring magnetic field strengths
    5. Electromagnetic induction
5. Geometical Optics
    1. Law of Rectilinear Reflection
    2. Snell's Law of refraction
    3. Total internal reflection
    4. Mirrors
    5. Lenses
    6. Optical instruments including the human eye
6. Wave Optics
    1. Interference of light
    2. Diffraction and dispersion of light
7. Modern Physics
    1. Atomic spectra
    2. Photoelectric Effect
    3. Nuclear radiation

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
- Interactive Activities
- Collaborative Peer/Group Activities
- Synchronous Discussion
- Listening to Audio Materials
- Facilitated Discussions
- Quizzes, Exams, and Surveys

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
- Social Media
- Q & A Discussion Boards
- 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
- Discussion Boards
- Email
- Video Conferencing Technology (e.g. Zoom, MS Teams, etc...)
- The Online Course Syllabus
- Office Hours
- Q & A Discussion Boards

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