Washtenaw Community College Comprehensive Report

PHY 222 Analytical Physics II
Effective Term: Fall 2023

Course Cover

College: Math, Science and Engineering Tech
Division: Math, Science and Engineering Tech
Department: Physical Sciences
Discipline: Physics
Course Number: 222
Org Number: 12340
Full Course Title: Analytical Physics II
Transcript Title: Analytical Physics II
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Course Change
Change Information:
Consultation with all departments affected by this course is required.
Course description
Total Contact Hours
Distribution of contact hours
Pre-requisite, co-requisite, or enrollment restrictions
Outcomes/Assessment
Objectives/Evaluation
Rationale: Update course description and course details.
Proposed Start Semester: Spring/Summer 2023
Course Description: This course is the second part of a two-course sequence in calculus-based physics for students majoring in science and engineering. In this course, students will cover the concepts of electricity, magnetism and light. Laboratory exercises are included to assist students in understanding these topics and to develop skills in data analysis methods.

Course Credit Hours

Variable hours: No
Credits: 5
Lecture Hours: Instructor: 75 **Student:** 75
Lab: Instructor: 30 **Student:** 30
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 105 **Student:** 105
Repeatable for Credit: NO
Grading Methods: Letter Grades
Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

Level 7

Requisites

Prerequisite

PHY 211 minimum grade "C"

General Education

MACRAO

MACRAO Science & Math
MACRAO Lab Science Course

General Education Area 4 - Natural Science

Assoc in Applied Sci - Area 4
Assoc in Science - Area 4
Assoc in Arts - Area 4

Michigan Transfer Agreement - MTA

MTA Lab Science

Request Course Transfer

Proposed For:

Eastern Michigan University
Ferris State University
Grand Valley State University
Lawrence Tech
Michigan State University
Oakland University
University of Detroit - Mercy
University of Michigan
Wayne State University
Western Michigan University
Other :
Central Michigan University

Student Learning Outcomes

1. Apply the appropriate physical principles to solve problems pertaining to electricity, magnetism and light.

   Assessment 1

   Assessment Tool: Outcome-related cumulative multiple-choice quiz
   Assessment Date: Winter 2024
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Answer key
   Standard of success to be used for this assessment: 75% of the students will score 73% or higher.
   Who will score and analyze the data: Physics faculty

2. Collect data, perform calculations and draw conclusions based on the results of the calculations.

   Assessment 1

   Assessment Tool: Outcome-related laboratory reports
   Assessment Date: Winter 2024
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 75% of students will score 73% or higher on each outcome-related lab report.
Who will score and analyze the data: Physics faculty

Assessment 2

Assessment Tool: Outcome-related laboratory quizzes
Assessment Date: Winter 2024
Assessment Cycle: Every Three Years
Course section(s)/other population: All sections
Number students to be assessed: All students
How the assessment will be scored: Answer key
Standard of success to be used for this assessment: 75% of students will score 73% or higher on each outcome-related quiz.
Who will score and analyze the data: Physics faculty

Course Objectives

1. Solve problems involving quantization of charge-units.
2. Solve problems using Coulomb's Law, calculation of forces between point charges.
3. Explain the concept of inverse square distance relationship compared to other possibilities and reasons why inverse square relationships would be suspected.
4. Define the concepts of conductors and insulators.
5. Explain the concepts of types of fields with examples from temperature versus scalar fields.
6. Solve problems involving calculation of an electric field (E-field) due to discrete point charges.
7. Solve problems involving calculation of E-field due to continuous charge distributions using the differential form of Coulomb's Law.
8. Describe the general concept of flux and see examples from other fields.
9. Explain the area vector and the definition of electric flux.
10. Solve problems involving electric flux.
11. Describe Gauss's Law.
12. Solve problems using Gauss's Law to find the field and understand the importance of symmetry.
13. Solve problems using Gauss's Law to find the charge density in a region.
14. Explain the concepts of potential and potential energy and use gravitation as an example.
15. Solve problems involving calculating the potential from the field and vice versa.
16. Solve problems involving calculating potential from discrete point changes.
17. Solve problems involving calculating potential from continuous charge distributions.
18. Solve problems involving potential energy of discrete and continuous charge distributions.
19. Explain the concept of capacitance.
20. Solve problems using capacitance.
21. Solve problems involving capacitors in series and parallel.
22. Solve problems involving energy in capacitors.
23. Explain the concept of dielectrics.
24. Explain the concept of moving charges and electric current.
25. Solve problems involving resistance as the ration of voltage to current.
26. Solve problems using Ohm's Law.
27. Solve problems involving energy and power in electric circuits.
28. Solve problems involving single loop circuits.
29. Solve problems involving multi-loop circuits and Kirchhoff's Laws.
30. Solve problems involving resistor-capacitor (RC) circuits.
31. Describe the concepts of the magnetic field, right-hand rule for magnetism, magnetic poles and torque principle for galvanometers and motors.
32. Solve problems involving trajectories in the magnetic field energy.
33. Solve problems involving magnetic force on a current carrying conductor.
34. Solve problems involving torque on a current loop.
35. Solve problems using Biot-Savart Law to calculate B-field due to various currents.
36. Solve problems using Ampere's Law used to calculate B-field due to various currents.
37. Solve problems involving calculation of B-field in solenoids and toroids.

38. Solve problems to calculate electromagnetic field (EMF) involving force on a moving charge.
39. Solve problems calculating EMF involving time rate of change of magnetic flux.
40. Describe the concept of inductance two ways: as the ratio of magnetic flux to the current that produced the flux and as the ratio of the EMF produced to the time rate of change of the current that caused it.
41. Solve problems involving the LR circuit.
42. Explain the comparison of the concepts of inductance and capacitance.
43. Solve problems involving energy and magnetic field and energy in an inductor.
44. Solve problems involving magnetic energy density.
45. Describe the concept of LC oscillations.
46. Solve problems regarding LC oscillations.
47. Explain the concept of LC oscillations and resonance.
48. Solve problems involving the series LCR circuit.
49. Solve problems involving the transformer.
50. Discuss the Maxwell's equations to solve problems involving calculation of B-field due to changing E-flux.
51. Discuss the concept of symmetry in the equation.
52. Solve problems pertaining to Maxwell's equations.
53. Solve problems involving reflection and refraction, light considered as a wave.
54. Solve problems involving index of refraction and Snell's Law.
55. Solve problems using the thin lens formula.
56. Solve problems using ray tracing.
57. Solve problems involving polarization.
58. Solve problems involving two source interference involving sound, light and longer EM waves.
59. Solve problems involving intensity in two source interference, phasors.
60. Solve problems dealing with single-slit problem solving.
61. Solve problems involving a diffraction grating.
62. Perform laboratory experiment(s) and analyses that pertain to charged particles or charged objects.
63. Perform laboratory experiment(s) and analyses that demonstrate the relationship between electric field and electric potential.
64. Perform laboratory experiment(s) and analyses using capacitors connected in series and in parallel.
65. Perform laboratory experiment(s) and analyses of simple circuits using resistors or light bulbs connected in series and in parallel.
66. Perform laboratory experiment(s) and analyses of the series RC circuit along with introductory work with an oscilloscope to determine the time constant of an RC circuit.
67. Perform laboratory experiment(s) and analyses using an e/m tube to show the effect of a magnetic field on the path of moving charges.
68. Perform laboratory experiment(s) and analyses to examine the magnetic field associated with a current-carrying slinky solenoid and to experimentally determine the permeability constant.
69. Perform laboratory experiment(s) and analyses of the inductance of a coil and examine the effect of adding iron to the coil and/or perform laboratory experiment(s) and analyses of the series RL circuit and use an oscilloscope to determine the time constant of the RL circuit.
70. Perform laboratory experiment(s) and analyses of a series RLC circuit including determining the resonant frequency and also taking appropriate voltage and current measurements to determine the R, L, and C values in a series RLC circuit where these constants are unknown.
71. Perform laboratory experiment(s) and analyses on several optical topics including determining index of refraction of an unknown substance; determining image location using mirrors and thin lenses; experimentally determining the wavelength of various light colors using the double slit experiment; and using a diffraction grating to analyze the diffraction angles of the wavelengths of visible light.

New Resources for Course

Course Textbooks/Resources

Textbooks

Halliday, Resnick, and Walker. *Fundamentals of Physics*, 12th ed. New York: John Wiley and Sons, 2022, ISBN: 978-1-119-801.

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Computer workstations/lab

Data projector/computer

Reviewer	Action	Date
Faculty Preparer:		
Danette Bull	*Faculty Preparer*	*Oct 31, 2022*
Department Chair/Area Director:		
Suzanne Albach	*Recommend Approval*	*Oct 31, 2022*
Dean:		
Tracy Schwab	*Recommend Approval*	*Nov 14, 2022*
Curriculum Committee Chair:		
Randy Van Wagnen	*Recommend Approval*	*Feb 08, 2023*
Assessment Committee Chair:		
Shawn Deron	*Recommend Approval*	*Feb 08, 2023*
Vice President for Instruction:		
Victor Vega	*Approve*	*Feb 09, 2023*

Washtenaw Community College Comprehensive Report

PHY 222 Analytical Physics II
Effective Term: Spring/Summer 2022

Course Cover

College: Math, Science and Engineering Tech
Division: Math, Science and Engineering Tech
Department: Physical Sciences
Discipline: Physics
Course Number: 222
Org Number: 12340
Full Course Title: Analytical Physics II
Transcript Title: Analytical Physics II
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Three Year Review / Assessment Report
Change Information:
Consultation with all departments affected by this course is required.
Outcomes/Assessment
Objectives/Evaluation
Rationale: This is a master syllabus review to make revisions following the course assessment and to make necessary changes in course outcomes. Please see the attachment section for a list of Reasons for Submission.
Proposed Start Semester: Fall 2021
Course Description: This course is the second part of a two-course sequence in calculus-based physics for students majoring in science and engineering. In this course, students will cover the concepts of electricity, magnetism, light and modern physics. Laboratory exercises are included to assist students in understanding these topics and to develop skills in data analysis methods.

Course Credit Hours

Variable hours: Yes
Credits: 0 – 5
Lecture Hours: Instructor: 60 **Student:** 60
Lab: Instructor: 45 **Student:** 45
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 0 to 105 **Student:** 0 to 105
Repeatable for Credit: NO
Grading Methods: Letter Grades
Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

Requisites

Prerequisite
PHY 211 minimum grade "C"

General Education

MACRAO
MACRAO Science & Math
MACRAO Lab Science Course
General Education Area 4 - Natural Science
Assoc in Applied Sci - Area 4
Assoc in Science - Area 4
Assoc in Arts - Area 4
Michigan Transfer Agreement - MTA
MTA Lab Science

Request Course Transfer

Proposed For:
Eastern Michigan University
Ferris State University
Grand Valley State University
Lawrence Tech
Michigan State University
Oakland University
University of Detroit - Mercy
University of Michigan
Wayne State University
Western Michigan University
Other :
Central Michigan University

Student Learning Outcomes

1. Apply the appropriate physical principles to solve problems pertaining to electricity, magnetism, light and modern physics.
   Assessment 1
   Assessment Tool: Cumulative multiple-choice quiz
   Assessment Date: Winter 2024
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Multiple-choice answer key
   Standard of success to be used for this assessment: 75% of the students should achieve a score of 73.0% or better for the cumulative multiple-choice quiz.
   Who will score and analyze the data: Appropriate physics faculty will analyze the data

2. Collect data, perform calculations and draw conclusions based on the results of the calculations.
   Assessment 1
   Assessment Tool: Laboratory reports and quizzes
   Assessment Date: Winter 2021
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Rubrics for lab reports and/or answer keys for lab quizzes are developed by individual instructors depending on how they wish to assess each lab. All student lab scores will be graded/reported on a percentage basis.

Standard of success to be used for this assessment: 75% of students should achieve a score of 73.0% or better for each lab report or quiz.
Who will score and analyze the data: Appropriate physics faculty will analyze the data.

Course Objectives

1. Solve problems involving quantization of charge-units.
2. Solve problems using Coulomb's Law, calculation of forces between point charges.
3. Explain the concept of inverse square distance relationship compared to other possibilities and reasons why inverse square relationships would be suspected.
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7. Solve problems involving calculation of E-field due to continuous charge distributions using the differential form of Coulomb's Law.
8. Describe the general concept of flux and see examples from other fields.
9. Explain the area vector and the definition of electric flux.
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12. Solve problems using Gauss's Law to find the field and understand the importance of symmetry.
13. Solve problems using Gauss's Law to find the charge density in a region.
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21. Solve problems involving capacitors in series and parallel.
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26. Solve problems using Ohm's Law.
27. Solve problems involving energy and power in electric circuits.
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29. Solve problems involving multi-loop circuits and Kirchhoff's Laws.
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31. Describe the concepts of the magnetic field, right-hand rule for magnetism, magnetic poles and torque principle for galvanometers and motors.
32. Solve problems involving trajectories in the magnetic field energy.
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59. Solve problems involving intensity in two source interference, phasors.
60. Solve problems dealing with single-slit problem solving.
61. Solve problems involving a diffraction grating.
62. Solve problems of relativistic speeds.
63. Solve problems pertaining to time dilation.
64. Solve problems involving simultaneity.
65. Solve problems involving length contraction.
66. Solve problems involving relativistic kinetic energy.
67. Solve problems involving the analysis of space-time graphs involving simultaneity, length contraction and twin paradox.
68. Perform laboratory experiment(s) and analyses that pertain to charged particles or charged objects.
69. Perform laboratory experiment(s) and analyses that demonstrate the relationship between electric field and electric potential.
70. Perform laboratory experiment(s) and analyses using capacitors connected in series and in parallel.
71. Perform laboratory experiment(s) and analyses of simple circuits using resistors or light bulbs connected in series and in parallel.
72. Perform laboratory experiment(s) and analyses of the series RC circuit along with introductory work with an oscilloscope to determine the time constant of an RC circuit.
73. Perform laboratory experiment(s) and analyses using an e/m tube to show the effect of a magnetic field on the path of moving charges.
74. Perform laboratory experiment(s) and analyses to examine the magnetic field associated with a current-carrying slinky solenoid and to experimentally determine the permeability constant.
75. Perform laboratory experiment(s) and analyses of the inductance of a coil and examine the effect of adding iron to the coil and/or perform laboratory experiment(s) and analyses of the series RL circuit and use an oscilloscope to determine the time constant of the RL circuit.
76. Perform laboratory experiment(s) and analyses of a series RCL circuit including determining the resonant frequency and also taking appropriate voltage and current measurements to determine the R, L, and C values in a series RLC circuit where these constants are unknown.
77. Perform laboratory experiment(s) and analyses on several optical topics including determining index of refraction of an unknown substance; determining image location using mirrors and thin lenses; experimentally determining the wavelength of various light colors using the double slit experiment; and using a diffraction grating to analyze the diffraction angles of the wavelengths of visible light.

New Resources for Course

Course Textbooks/Resources

Textbooks

Halliday, Resnick, and Walker. *Fundamentals of Physics*, 10th ed. New York: John Wiley and Sons, 2014, ISBN: 9781118230732.

Manuals

Periodicals
Software

Equipment/Facilities

Level III classroom
Computer workstations/lab
TV/VCR
Data projector/computer
Other: Mechanical Universe videos

Reviewer	Action	Date
Faculty Preparer:		
Danette Bull	*Faculty Preparer*	*Aug 06, 2021*
Department Chair/Area Director:		
Suzanne Albach	*Recommend Approval*	*Aug 16, 2021*
Dean:		
Victor Vega	*Recommend Approval*	*Aug 18, 2021*
Curriculum Committee Chair:		
Randy Van Wagnen	*Recommend Approval*	*Jan 27, 2022*
Assessment Committee Chair:		
Shawn Deron	*Recommend Approval*	*Jan 30, 2022*
Vice President for Instruction:		
Kimberly Hurns	*Approve*	*Jan 30, 2022*

Washtenaw Community College Comprehensive Report

PHY 222 Analytical Physics II
Effective Term: Spring/Summer 2018

Course Cover

Division: Math, Science and Engineering Tech
Department: Physical Sciences
Discipline: Physics
Course Number: 222
Org Number: 12340
Full Course Title: Analytical Physics II
Transcript Title: Analytical Physics II
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Three Year Review / Assessment Report
Change Information:
Consultation with all departments affected by this course is required.
Rationale: Three year review
Proposed Start Semester: Spring/Summer 2018
Course Description: This course is the second part of a two-course sequence in calculus-based physics for students majoring in science and engineering. Students will cover the concepts of electricity, magnetism, light and modern physics. Laboratory exercises are included to assist students in understanding these topics and to develop skills in data analysis methods.

Course Credit Hours

Variable hours: No
Credits: 5
Lecture Hours: Instructor: 60 **Student:** 60
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Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 105 **Student:** 105
Repeatable for Credit: NO
Grading Methods: Letter Grades
Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

Requisites

Prerequisite
PHY 211 minimum grade "C"

General Education

MACRAO
MACRAO Science & Math

MACRAO Lab Science Course

General Education Area 4 - Natural Science

Assoc in Applied Sci - Area 4

Assoc in Science - Area 4

Assoc in Arts - Area 4

Michigan Transfer Agreement - MTA

MTA Lab Science

Request Course Transfer

Proposed For:

Central Michigan University
Eastern Michigan University
Ferris State University
Grand Valley State University
Lawrence Tech
Michigan State University
Oakland University
University of Detroit - Mercy
University of Michigan
Wayne State University
Western Michigan University

Student Learning Outcomes

1. Apply the appropriate physical principles to solve problems pertaining to electricity, magnetism, light and modern physics.

   Assessment 1

   Assessment Tool: Written exam
   Assessment Date: Winter 2018
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: Random selection of students from all sections
   How the assessment will be scored: Departmentally-developed rubric
   Standard of success to be used for this assessment: 75% of the students should achieve a score of 2.5 out of 4 or better per question.
   Who will score and analyze the data: Departmental faculty

2. Collect data, perform calculations and draw conclusions based on the results of the calculations.

   Assessment 1

   Assessment Tool: Laboratory reports
   Assessment Date: Winter 2018
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: Random selection of students from all sections
   How the assessment will be scored: Departmentally-developed rubric
   Standard of success to be used for this assessment: 75% of the students should achieve a score of 75% or higher
   Who will score and analyze the data: Departmental faculty

Course Objectives

1. Solve problems involving quantization of charge-units.
2. Solve problems using Coulomb's Law, calculation of forces between point charges.
3. Explain the concept of inverse square distance relationship compared to other possibilities and

reasons why inverse square relationships would be suspected.
4. Define the concepts of conductors and insulators.
5. Perform laboratory analysis of positive and negative charge, Van DeGraaff Generator and the electrophorus.
6. Explain the concepts of types of fields with examples from temperature versus scalar fields.
7. Solve problems involving calculation of E-field due to discrete point charges.
8. Solve problems involving calculation of E-field due to continuous charge distributions using the differential form of Coulomb's Law.
9. Perform laboratory analysis of the potential in the region around a simulated thunderstorm and plot the electric field in the region.
10. Describe the general concept of flux and see examples from other fields.
11. Explain the area vector and the definition of electric flux.
12. Solve problems involving electric flux.
13. Describe the Gauss' Law.
14. Solve problems using Gauss' Law to find the field and understand the importance of symmetry.
15. Solve problems using Gauss' Law to find the charge density in a region.
16. Explain the concepts of potential and potential energy and use gravitation as an example.
17. Solve problems involving calculating the potential from the field and vice versa.
18. Solve problems involving calculating potential from discrete point changes.
19. Solve problems involving calculating potential from continuous charge distributions.
20. Solve problems involving potential energy of discrete and continuous charge distributions.
21. Explain the concept of capacitance.
22. Solve problems using capacitance.
23. Solve problems involving capacitors in series and parallel.
24. Solve problems involving energy in capacitors.
25. Explain the concept of dielectrics.
26. Perform laboratory analysis of charging a capacitor and find capacitance experimentally.
27. Explain the concept of moving charges and electric current.
28. Solve problems involving resistance as the ration of voltage to current.
29. Solve problems using Ohm's Law.
30. Solve problems involving energy and power in electric circuits.
31. Solve problems involving single loop circuits.
32. Solve problems involving multi-loop circuits and Kirchoff's Laws.
33. Solve problems involving RC circuits.
34. Perform laboratory analysis of the RC circuit and an introductory work with an oscilloscope.
35. Describe the concepts of the magnetic field, right-hand rule for magnetism, magnetic poles and torque principle for galvanometers and motors.
36. Solve problems involving trajectories in the magnetic field energy.
37. Solve problems involving magnetic force on a current carrying conductor.
38. Solve problems involving torque on a current loop.
39. Perform lab analysis of magnetic fields, field around a wire and e/m tube.
40. Solve problems using Bio-Savant Law to calculate B-field due to various currents.
41. Solve problems using Ampere's Law used to calculate B-field due to various currents.
42. Solve problems involving calculation of B-field in solenoids and toroids.
43. Solve problems to calculate EMF involving force on a moving charge.
44. Solve problems calculating EMF involving time rate of change of magnetic flux.
45. Perform laboratory analysis of Farady's Law.
46. Describe the concept of inductance two ways: as the ratio of magnetic flux to the current that produced the flux and as the ratio of the EMF produced to the time rate of change of the current that caused it.
47. Solve problems involving the LR circuit.
48. Explain the comparison of the concepts of inductance and capacitance.

49. Solve problems involving energy and magnetic field and energy in an inductor.
50. Solve problems involving magnetic energy density.
51. Perform laboratory analysis of the inductance of a coil and examine the effect of adding iron to the coil.
52. Describe the concept of LC oscillations.
53. Solve problems regarding LC oscillations.
54. Explain the concept of LC oscillations and resonance.
55. Perform laboratory analysis of an R-C-L circuit resonance.
56. Solve problems involving the series LCR circuit.
57. Solve problems involving the transformer.
58. Discuss the Maxwell's equations to solve problems involving calculation of B-field due to changing E-flux.
59. Discuss the concept of symmetry in the equation.
60. Solve problems pertaining to Maxwell's equations.
61. Solve problems involving reflection and refraction, light considered as a wave.
62. Solve problems involving index of refraction and Snell's Law.
63. Solve problems using the thin lens formula.
64. Solve problems using ray tracing.
65. Solve problems involving polarization.
66. Perform laboratory analysis of the index of refraction of several different substances using both Snell's Law and Brewster's Law and the thin lens equation.
67. Solve problems involving two source interference involving sound, light and longer EM waves.
68. Solve problems involving intensity in two source interference, phasors.
69. Solve problems dealing with single-slit problem solving.
70. Solve problems involving a diffraction grating.
71. Solve problems of relativistic speeds.
72. Solve problems pertaining to time dilation.
73. Solve problems involving simultaneity.
74. Solve problems involving length contraction.
75. Solve problems involving relativistic kinetic energy.
76. Perform laboratory analysis of space-time graphs involving simultaneity, length contraction and twin paradox.

New Resources for Course

Course Textbooks/Resources

Textbooks

Halliday, Resnick, and Walker. *Fundamentals of Physics*, 10th ed. New York: John Wiley and Sons, 2014, ISBN: 9781118230732.

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Computer workstations/lab

TV/VCR

Data projector/computer

Other: Mechanical Universe videos

Reviewer	Action	Date
Faculty Preparer:		

Amir Fayaz	*Faculty Preparer*	*Oct 25, 2017*
Department Chair/Area Director:		
Kathleen Butcher	*Recommend Approval*	*Nov 21, 2017*
Dean:		
Kristin Good	*Recommend Approval*	*Nov 27, 2017*
Curriculum Committee Chair:		
David Wooten	*Recommend Approval*	*Jan 27, 2018*
Assessment Committee Chair:		
Michelle Garey	*Recommend Approval*	*Jan 29, 2018*
Vice President for Instruction:		
Kimberly Hurns	*Approve*	*Jan 30, 2018*