Washtenaw Community College Comprehensive Report

PHY 211 Analytical Physics I
Effective Term: Fall 2024

Course Cover

College: Math, Science and Engineering Tech
Division: Math, Science and Engineering Tech
Department: Physical Sciences
Discipline: Physics
Course Number: 211
Org Number: 12340
Full Course Title: Analytical Physics I
Transcript Title: Analytical Physics I
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:
Pre-requisite, co-requisite, or enrollment restrictions
Objectives/Evaluation
Rationale: PHY 211 requires an advanced level of foundational physics knowledge and mathematical skills that students must have prior to enrollment. The current pre-requisite language allows for PHY 111 'or, high school physics'. The new language will drop the 'or, high school physics' and require that all students complete PHY 111 to help ensure that students have a requisite level of physics knowledge and mathematical skills and are adequately prepared to take PHY 211.
Proposed Start Semester: Winter 2023
Course Description: In this course, students will develop their understanding of the concepts of mechanics (kinematics, forces, work-energy, impulse, translational and angular momentum, fluids), vibration (and waves) and fundamental thermodynamics. Laboratory exercises are included to assist students in understanding the above topics and to develop skills in data analysis methods. This is the first of a two-course sequence in calculus-based Newtonian physics for students intending to major in science or engineering.

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

Requisites

Prerequisite
PHY 111 minimum grade "C"
and
Prerequisite
MTH 191 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
Jackson Community College
Lawrence Tech
Michigan State University
Oakland University
University of Detroit - Mercy
University of Michigan
Wayne State University
Western Michigan University
Central Michigan University

Student Learning Outcomes

1. Apply the appropriate physical principles to solve problems pertaining to mechanics, wave motion and heat.
   Assessment 1
   Assessment Tool: Outcome-related written exam questions
   Assessment Date: Fall 2022
   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: Full-time Physics faculty

2. Perform laboratory experiment(s) and analyses to collect data, perform calculations and draw conclusions based on the results of the calculations.
   Assessment 1
   Assessment Tool: Outcome-related laboratory reports
   Assessment Date: Fall 2022
   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 73.0% or higher for each lab report
Who will score and analyze the data: Full-time Physics faculty

Assessment 2

Assessment Tool: Outcome-related laboratory quizzes
Assessment Date: Fall 2022
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 for each lab quiz.
Who will score and analyze the data: Full-time Physics faculty

Course Objectives

1. Define displacement, velocity, and acceleration.
2. Derive equations for displacement, velocity, and acceleration from definition for one and two dimensional motion using algebra, trigonometry, and calculus.
3. Solve kinematics problems (English and/or metric) similar to those selected from the problems in the text.
4. State and explain Newton's three laws of motion as well as the concepts of mass and weight.
5. Discuss the attributes of gravitational, elastic, tension, normal, applied, friction and drag forces and the modeling of these forces. Identify the existence of these forces in problem situations.
6. Apply their knowledge of forces to solve problems similar to those seen in class and those selected from the problems in the text.
7. Demonstrate the application of the definition of work and power to solve problems similar to those seen in class and those selected from the problems in the text.
8. Derive kinetic, gravitational, and elastic energy as well as the work-energy theorem.
9. Demonstrate how and when to efficiently apply work-energy concepts to solve problems similar to those seen in class and those selected from the problems in the text.
10. Explain the components of Impulse-momentum and how they differ from F=ma.
11. Explain the components of a non-mass conservative ("flow") F=ma.
12. Demonstrate how and when to efficiently apply impulse-momentum concepts and non-mass-conservative F=ma to solve problems similar to those seen in class and those selected from the problems in the text.
13. Describe the properties of the center of mass of a system of particles.
14. Describe the properties not attributable to the center of mass of a system of particles.
15. Demonstrate how and when to efficiently apply center of mass concepts to solve problems similar to those seen in class and those selected from the problems in the text.
16. Define angular displacement, velocity, and acceleration.
17. Derive equations for angular displacement, velocity, and acceleration from definition using algebra, trig, and calculus.
18. Solve angular kinematics problems (English and/or metric) similar to those selected from the problems in the text.
19. State and understand the circular to angular transformations.
20. Describe the concept of moment of inertia and its relationship to angular acceleration.
21. Demonstrate the application of the definition of torque to solve problems similar to those seen in class and those selected from the problems in the text.
22. Apply their knowledge of forces and torques to solve problems similar to those seen in class and those selected from the problems in the text.
23. Demonstrate the application of the definition of angular work and power to solve problems similar to those seen in class and those selected from the problems in the text.

24. Derive angular kinetic energy.
25. Demonstrate how and when to efficiently apply work-energy concepts to solve problems similar to those seen in class and those selected from the problems in the text.
26. Explain the components of angular impulse-momentum.
27. Demonstrate how and when to efficiently apply angular impulse-momentum concepts to solve problems similar to those seen in class and those selected from the problems in the text.
28. Define density and pressure.
29. Apply (buoyant) force concepts to a fluid material
30. Apply work-energy concepts to a fluid.
31. Define common terms used in the description of vibration and wave motion.
32. Apply force and energy concepts to vibration and wave motion problems similar to those seen in class and those selected from the problems in the text.
33. Define common terms and constants used in thermodynamics.
34. Recognize the first and second laws of thermodynamics.
35. Apply the principles of thermodynamics to a gas-system.
36. Compute the heat required to change a material's temperature and phase.
37. Define fluid concepts such as Pascal’s Principle, Archimedes’ Principle, the Equation of Continuity and Bernoulli’s Equation and use these concepts to solve problems similar to those seen in class and those selected from problems in the text.
38. Define the difference between transverse and longitudinal waves.
39. Solve problems related to sound waves traveling in air, in tubes and also the Doppler Effect.
40. Perform laboratory experiment(s) and analyses that pertain to gravitational acceleration.
41. Perform laboratory experiment(s) and analyses that pertain to projectile motion.
42. Perform laboratory experiment(s) and analyses that pertain to frictional forces and static and kinetic coefficients of friction.
43. Perform laboratory experiment(s) and analyses that pertain to drag forces acting on falling objects.
44. Perform laboratory experiment(s) and analyses that pertain to the work-kinetic energy theorem.
45. Perform laboratory experiment(s) and analyses that pertain to elastic or inelastic collisions and conservation of momentum.
46. Perform laboratory experiment(s) and analyses that pertain to rotational inertia.
47. Perform laboratory experiment(s) and analyses that pertain to static equilibrium and/or torque.
48. Perform laboratory experiment(s) and analyses that pertain to simple harmonic motion.
49. Perform laboratory experiment(s) and analyses that pertain to longitudinal (sound) wave motion and/or transverse wave motion.

New Resources for Course

Course Textbooks/Resources

Textbooks

Hailday, Resnick, and Walker. *Fundamentals of Physics*, 11th ed. Wiley, 2020, ISBN: 9781119460152.

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Reviewer	Action	Date
Faculty Preparer:		
Danette Bull	*Faculty Preparer*	*Oct 19, 2023*
Department Chair/Area Director:		
Suzanne Albach	*Recommend Approval*	*Oct 19, 2023*

Dean:		
Tracy Schwab	*Recommend Approval*	*Oct 27, 2023*
Curriculum Committee Chair:		
Randy Van Wagnen	*Recommend Approval*	*Feb 14, 2024*
Assessment Committee Chair:		
Jessica Hale	*Recommend Approval*	*Mar 12, 2024*
Vice President for Instruction:		
Brandon Tucker	*Approve*	*Mar 13, 2024*

Washtenaw Community College Comprehensive Report

PHY 211 Analytical Physics I
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: 211
Org Number: 12340
Full Course Title: Analytical Physics I
Transcript Title: Analytical Physics I
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.
Distribution of contact hours
Outcomes/Assessment
Rationale: Revising the master syllabus to reflect a ratio of lecture to lab time that more accurately aligns with transfer university expectations.
Proposed Start Semester: Winter 2023
Course Description: This is the first of a two-course sequence in calculus-based Newtonian physics for students intending to major in science or engineering. Physics 211 develops the concepts of mechanics (kinematics, forces, work-energy, impulse, translational and angular momentum, fluids), vibration (and waves) and fundamental thermodynamics. Laboratory exercises are included to assist students in understanding the above 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

Requisites

Prerequisite minimum grade "C"
high school physics
or
Prerequisite
PHY 111 minimum grade "C"
and
Prerequisite
MTH 191 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
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MTA Lab Science

Request Course Transfer

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

Student Learning Outcomes

1. Apply the appropriate physical principles to solve problems pertaining to mechanics, wave motion and heat.
   Assessment 1
   Assessment Tool: Outcome-related written exam questions
   Assessment Date: Fall 2022
   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: Full-time 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: Fall 2022
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 73.0% or higher for each lab report
Who will score and analyze the data: Full-time Physics faculty

Assessment 2

Assessment Tool: Outcome-related laboratory quizzes
Assessment Date: Fall 2022
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 for each lab quiz.
Who will score and analyze the data: Full-time Physics faculty

Course Objectives

1. Define displacement, velocity, and acceleration.
2. Derive equations for displacement, velocity, and acceleration from definition for one and two dimensional motion using algebra, trigonometry, and calculus.
3. Solve kinematics problems (English and/or metric) similar to those selected from the problems in the text.
4. State and explain Newton's three laws of motion as well as the concepts of mass and weight.
5. Discuss the attributes of gravitational, elastic, and frictional forces and the modeling of these forces. Identify the existence of these forces in problem situations.
6. Apply their knowledge of forces to solve problems similar to those seen in class and those selected from the problems in the text.
7. Demonstrate the application of the definition of work and power to solve problems similar to those seen in class and those selected from the problems in the text.
8. Derive kinetic, gravitational, and elastic energy as well as the work-energy theorem.
9. Demonstrate how and when to efficiently apply work-energy concepts to solve problems similar to those seen in class and those selected from the problems in the text.
10. Explain the components of Impulse-momentum and how they differ from F=ma.
11. Explain the components of a non-mass conservative ("flow") F=ma.
12. Demonstrate how and when to efficiently apply impulse-momentum concepts and non-mass-conservative F=ma to solve problems similar to those seen in class and those selected from the problems in the text.
13. Describe the properties of the center of mass of a system of particles.
14. Describe the properties not attributable to the center of mass of a system of particles.
15. Demonstrate how and when to efficiently apply center of mass concepts to solve problems similar to those seen in class and those selected from the problems in the text.
16. Define angular displacement, velocity, and acceleration.
17. Derive equations for angular displacement, velocity, and acceleration from definition using algebra, trig, and calculus.
18. Solve angular kinematics problems (English and/or metric) similar to those selected from the problems in the text.
19. State and understand the circular to angular transformations.
20. Describe the concept of moment of inertia and its relationship to angular acceleration.
21. Demonstrate the application of the definition of torque to solve problems similar to those seen in class and those selected from the problems in the text.
22. Apply their knowledge of forces and torques to solve problems similar to those seen in class and those selected from the problems in the text.

23. Demonstrate the application of the definition of angular work and power to solve problems similar to those seen in class and those selected from the problems in the text.
24. Derive angular kinetic energy.
25. Demonstrate how and when to efficiently apply work-energy concepts to solve problems similar to those seen in class and those selected from the problems in the text.
26. Explain the components of angular impulse-momentum.
27. Demonstrate how and when to efficiently apply angular impulse-momentum concepts to solve problems similar to those seen in class and those selected from the problems in the text.
28. Define density and pressure.
29. Apply force concepts to a fluid material
30. Apply work-energy concepts to a fluid.
31. Define common terms used in the description of vibration and wave motion.
32. Apply force and energy concepts to vibration and wave motion problems similar to those seen in class and those selected from the problems in the text.
33. Define common terms and constants used in thermodynamics.
34. Recognize the first and second laws of thermodynamics.
35. Apply the principles of thermodynamics to a gas-system.
36. Compute the heat required to change a material's temperature and phase.

New Resources for Course

Course Textbooks/Resources

Textbooks

Hailday, Resnick, and Walker. *Fundamentals of Physics*, 11th ed. Wiley, 2020, ISBN: 9781119460152.

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Reviewer	Action	Date
Faculty Preparer:		
Danette Bull	*Faculty Preparer*	*Dec 01, 2022*
Department Chair/Area Director:		
Suzanne Albach	*Recommend Approval*	*Dec 02, 2022*
Dean:		
Tracy Schwab	*Recommend Approval*	*Dec 08, 2022*
Curriculum Committee Chair:		
Randy Van Wagnen	*Recommend Approval*	*Feb 06, 2023*
Assessment Committee Chair:		
Shawn Deron	*Recommend Approval*	*Feb 06, 2023*
Vice President for Instruction:		
Victor Vega	*Approve*	*Feb 09, 2023*

Washtenaw Community College Comprehensive Report

PHY 211 Analytical Physics I
Effective Term: Spring/Summer 2020

Course Cover

Division: Math, Science and Engineering Tech
Department: Physical Sciences
Discipline: Physics
Course Number: 211
Org Number: 12340
Full Course Title: Analytical Physics I
Transcript Title: Analytical Physics I
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: A recent Course Assessment was completed, and based on the Assessment results and review of the current Master Syllabus, no changes to the Master Syllabus are deemed necessary at this time.
Proposed Start Semester: Fall 2019
Course Description: This is the first of a two-course sequence in calculus-based Newtonian physics for students intending to major in science or engineering. Physics 211 develops the concepts of mechanics (kinematics, forces, work-energy, impulse, translational and angular momentum, fluids), vibration (and waves) and fundamental thermodynamics. Laboratory exercises are included to assist students in understanding the above topics and to develop skills in data analysis methods.

Course Credit Hours

Variable hours: No
Credits: 5
Lecture Hours: Instructor: 60 **Student:** 60
Lab: Instructor: 45 **Student:** 45
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 minimum grade "C"
high school physics
or

Prerequisite
PHY 111 minimum grade "C"
and
Prerequisite
MTH 191 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
College for Creative Studies
Eastern Michigan University
Ferris State University
Grand Valley State University
Jackson Community College
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 mechanics, wave motion and heat.
   Assessment 1
   Assessment Tool: Written exam
   Assessment Date: Winter 2022
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students in up to three sections or a random selection of 60% 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 (3.0 or better on a 4.0 rubric scale) on the outcome-related questions.
   Who will score and analyze the data: Departmental full-time Physics 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 2022
   Assessment Cycle: Every Three Years

Course section(s)/other population: All sections
Number students to be assessed: All students or a random selection of 60% 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: Full-time Physics faculty

Course Objectives

1. Define displacement, velocity, and acceleration.
2. Derive equations for displacement, velocity, and acceleration from definition for one and two dimensional motion using algebra, trigonometry, and calculus.
3. Solve kinematics problems (English and/or metric) similar to those selected from the problems in the text.
4. State and explain Newton's three laws of motion as well as the concepts of mass and weight.
5. Discuss the attributes of gravitational, elastic, and frictional forces and the modeling of these forces. Identify the existence of these forces in problem situations.
6. Apply their knowledge of forces to solve problems similar to those seen in class and those selected from the problems in the text.
7. Demonstrate the application of the definition of work and power to solve problems similar to those seen in class and those selected from the problems in the text.
8. Derive kinetic, gravitational, and elastic energy as well as the work-energy theorem.
9. Demonstrate how and when to efficiently apply work-energy concepts to solve problems similar to those seen in class and those selected from the problems in the text.
10. Explain the components of Impulse-momentum and how they differ from F=ma.
11. Explain the components of a non-mass conservative ("flow") F=ma.
12. Demonstrate how and when to efficiently apply impulse-momentum concepts and non-mass-conservative F=ma to solve problems similar to those seen in class and those selected from the problems in the text.
13. Describe the properties of the center of mass of a system of particles.
14. Describe the properties not attributable to the center of mass of a system of particles.
15. Demonstrate how and when to efficiently apply center of mass concepts to solve problems similar to those seen in class and those selected from the problems in the text.
16. Define angular displacement, velocity, and acceleration.
17. Derive equations for angular displacement, velocity, and acceleration from definition using algebra, trig, and calculus.
18. Solve angular kinematics problems (English and/or metric) similar to those selected from the problems in the text.
19. State and understand the circular to angular transformations.
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28. Define density and pressure.
29. Apply force concepts to a fluid material
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31. Define common terms used in the description of vibration and wave motion.
32. Apply force and energy concepts to vibration and wave motion problems similar to those seen in class and those selected from the problems in the text.
33. Define common terms and constants used in thermodynamics.
34. Recognize the first and second laws of thermodynamics.
35. Apply the principles of thermodynamics to a gas-system.
36. Compute the heat required to change a material's temperature and phase.

New Resources for Course

Course Textbooks/Resources

Textbooks

Hailday, Resnick, and Walker. *Fundamentals of Physics*, 10th ed. Wiley, 2014, ISBN: 9781118233764.

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Reviewer	Action	Date
Faculty Preparer:		
Danette Bull	*Faculty Preparer*	*Aug 20, 2019*
Department Chair/Area Director:		
Suzanne Albach	*Recommend Approval*	*Aug 20, 2019*
Dean:		
Victor Vega	*Recommend Approval*	*Sep 17, 2019*
Curriculum Committee Chair:		
Lisa Veasey	*Recommend Approval*	*Jan 22, 2020*
Assessment Committee Chair:		
Shawn Deron	*Recommend Approval*	*Jan 27, 2020*
Vice President for Instruction:		
Kimberly Hurns	*Approve*	*Jan 29, 2020*

Washtenaw Community College Comprehensive Report

PHY 211 Analytical Physics I
Effective Term: Spring/Summer 2018

Course Cover

Division: Math, Science and Engineering Tech
Department: Physical Sciences
Discipline: Physics
Course Number: 211
Org Number: 12340
Full Course Title: Analytical Physics I
Transcript Title: Analytical Physics I
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission:
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 is the first of a two-course sequence in calculus-based Newtonian physics for students intending to major in science or engineering. Physics 211 develops the concepts of mechanics (kinematics, forces, work-energy, impulse, translational and angular momentum, fluids), vibration (and waves) and fundamental thermodynamics. Laboratory exercises are included to assist students in understanding the above topics and to develop skills in data analysis methods.

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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 minimum grade "C"
high school physics
or
Prerequisite
PHY 111 minimum grade "C"

and

Prerequisite

MTH 191 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
College for Creative Studies
Eastern Michigan University
Ferris State University
Grand Valley State University
Jackson Community College
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 Mechanics, Wave motion and Heat

   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 full-time Physics 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 Section

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: Full time Physics faculty

Course Objectives

1. Define displacement, velocity, and acceleration.
2. Derive equations for displacement, velocity, and acceleration from definition for one and two dimensional motion using algebra, trig, and calculus.
3. Solve kinematics problems (English and/or metric) similar to those selected from the problems in the text.
4. State and explain Newton's three laws of motion as well as the concepts of mass and weight.
5. Discuss the attributes of gravitational, elastic, and frictional forces, their modeling, and identify the existence of these forces in problem situations.
6. Apply their knowledge of forces to solve problems similar to those seen in class and those selected from the problems in the text.
7. Demonstrate the application of the definition of work and power, to solve problems similar to those seen in class and those selected from the problems in the text.
8. Derive kinetic, gravitational, and elastic energy as well as the work-energy theorem.
9. Demonstrate how and when to efficiently apply work-energy concepts to solve problems similar to those seen in class and those selected from the problems in the text.
10. Explain the components of Impulse-momentum and how they differ from F=ma.
11. Explain the components of a non-mass conservative ("flow") F=ma.
12. Demonstrate how and when to efficiently apply impulse-momentum concepts and non-mass-conservative F=ma to solve problems similar to those seen in class and those selected from the problems in the text.
13. Describe the properties of the center of mass of a system of particles.
14. Describe the properties not attributable to the center of mass of a system of particles.
15. Demonstrate how and when to efficiently apply center of mass concepts to solve problems similar to those seen in class and those selected from the problems in the text.
16. Define angular displacement, velocity, and acceleration.
17. Derive equations for angular displacement, velocity, and acceleration from definition using algebra, trig, and calculus.
18. Solve angular kinematics problems (English and/or metric) similar to those selected from the problems in the text.
19. State and understand the circular to angular transformations.
20. Describe the concept of Moment of inertia and its relationship to angular acceleration.
21. Demonstrate the application of the definition of Torque to solve problems similar to those seen in class and those selected from the problems in the text.
22. Apply their knowledge of forces and torques to solve problems similar to those seen in class and those selected from the problems in the text.
23. Demonstrate the application of the definition of angular work and power to solve problems similar to those seen in class and those selected from the problems in the text.
24. Derive angular kinetic energy.
25. Demonstrate how and when to efficiently apply work-energy concepts to solve problems similar to those seen in class and those selected from the problems in the text.
26. Explain the components of angular impulse-momentum.
27. Demonstrate how and when to efficiently apply angular impulse-momentum concepts to solve problems similar to those seen in class and those selected from the problems in the text.
28. Define density and pressure.
29. Apply force concepts to a fluid material
30. Apply work-energy concepts to a fluid.

31. Define common terms used in the description of vibration and wave motion.
32. Apply force and energy concepts to vibration and wave motion problems similar to those seen in class and those selected from the problems in the text.
33. Define common terms and constants used in thermodynamics.
34. Recogize the first and second laws of thermodynamics.
35. Apply the principles of thermodynamics to a gas-system.
36. Compute the heat required to change a material's temperature and phase.

New Resources for Course

Course Textbooks/Resources

Textbooks

Hailday, Resnick, and Walker. *Fundamentals of Physics*, 10th ed. Wiley, 2014, ISBN: 9781118233764.

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

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*