Course Syllabus

Course Information

Course Title: Physics with Calculus 1

Subject and Number: PHY 2048

Course Description: This calculus-based course serves as the first in a two-part series, covering topics like kinematics, dynamics, energy, momentum, rotational motion, fluid dynamics, oscillatory motion, and waves. Designed for science and engineering majors, the course integrates critical thinking, analytical skills, and real-world applications. Student learning outcomes: students will solve analytical problems describing different types of motion, including translational, rotational, and simple harmonic motion; students will apply newton's laws, and conservation laws to solve analytical problems of mechanics; students will identify and analyze relevant information presented in various formats such as graphs, tables, diagrams, and/or mathematical formulations; and students will solve real-world problems using critical thinking skills and knowledge developed from this course. Prerequisites: High school physics or PHY 1025, PHY 2053 or departmental approval and MAC 2311; corequisite: PHY 2048L. Special fee.

Class Number: LOREM IPSUM

Term and Year: LOREM IPSUM

Course Modality: MDC Modalities

Instructor Information

Name: LOREM IPSUM

Department and Campus: LOREM IPSUM

Office location: LOREM IPSUM

Office hours: *(communicate course office hours with students)*

Phone number: 123-456-7890

Email: LOREM IPSUM

Communication Policy: *(Faculty will establish protocols for communication with students)*

Required Textbook, Course Materials, and Technology

Required course materials: *(Textbook(s), library reserves, shark pack, and/or other required readings. Include ISBN Number and author(s))*

List optional/supplemental materials/OER: LOREM IPSUM

Technology & Technical Skill Requirements: *(Technology tools or equipment students need to complete this course are included)*

Grading Policy & Assessment Methods

List all activities, papers, quizzes, tests, etc. including grading scale used for final grade calculation. Relationships between the final grade and the learner's accumulated points or percentages/weights breakdown for each assessment or component of the course grade.

Include policy on late submissions.

For MDC Live and MDC Online courses, include policy regarding exams (e.g., ProctorU, Respondus Lockdown and Monitor, etc.)

If applicable, include guidelines for extra credit.

Incomplete Grades: View the college's procedures for Incomplete Grades

Miami Dade College Policies

Attendance Policy: *(Faculty include precise statements about illnesses/emergencies/ tardiness, missed assignments/make-up.)*

Students Rights and Responsibilities: *Policies addressing academic integrity and plagiarism, code of conduct, grade appeals, religious observations, services for students with special needs, student complaints, and other.*

For more information, visit the Student's Rights and Responsibilities page

Available Support Services & Resources

- Tutoring Labs and Technology – Learning Resources
- Virtual Tutoring through Learning Resources or Smarthinking Online Tutoring
- ACCESS: A Comprehensive Center for Exceptional Student Services
- Advisement
- Password and Login Technical Support
- Technical Support for MDC Live and MDC Online Courses
- SMART Plan

(Faculty select from the above if applicable and include additional course/campus specific resources)

Available Support Services & Resources

- Public Safety - Services
- Hurricane and Other Natural Disasters: In the event of a hurricane or other disaster, the class follows the schedule established by the College for campus-based courses. Please visit the MDC website or call the MDC Hotline (305-237-7500) for situation updates.

Course Description

PHY2048 | Physics with Calculus 1 | 4 credits

This calculus-based course serves as the first in a two-part series, covering topics like kinematics, dynamics, energy, momentum, rotational motion, fluid dynamics, oscillatory motion, and waves. Designed for science and engineering majors, the course integrates critical thinking, analytical skills, and real-world applications. Student learning outcomes: students will solve analytical problems describing different types of motion, including translational, rotational, and simple harmonic motion; students will apply newton's laws, and conservation laws to solve analytical problems of mechanics; students will identify and analyze relevant information presented in various formats such as graphs, tables, diagrams, and/or mathematical formulations; and students will solve real-world problems using critical thinking skills and knowledge developed from this course. Prerequisites: High school physics or PHY 1025, PHY 2053 or departmental approval and MAC 2311; corequisite: PHY 2048L. Special fee.

Course Competencies

Competency 1:

The student will demonstrate an understanding of the scientific method by:

- Explaining how the scientific method differs from day-to-day application of observation, generalization, and prediction.

Learning Outcomes

- Critical thinking
- Information Literacy
- Numbers / Data

Competency 2:

The student will demonstrate an understanding of basic kinematics by:

- Explaining the difference between average and instantaneous velocity or acceleration.
- Applying techniques from calculus to calculate the velocity and acceleration of an object when the position is given as a function of time.
- Using kinematics equations to calculate later position and velocity for an object undergoing constant acceleration in one or two dimensions.
- Using the Galilean formulas to transform a velocity or acceleration from one reference frame to another.
- Calculating centripetal acceleration for an object moving in a circle.

Learning Outcomes

- Critical thinking

- Information Literacy
- Numbers / Data

Competency 3:

The student will demonstrate an understanding of translational dynamics and gravity by:

- Sketching a "free body" diagram to represent the forces acting on a system of masses.
- Expressing static or kinetic friction in terms of the normal forces.
- Writing and solving a set of component force equations for each mass in the system.
- Calculating the properties of a circular orbit.

Learning Outcomes

- Critical thinking
- Information Literacy
- Numbers / Data

Competency 4:

The student will demonstrate an understanding of the concepts of work and energy by:

- Using integration to calculate the work which a force does on a moving object.
- Calculating the power which a force supplies to a moving object.

Learning Outcomes

- Critical thinking
- Information Literacy
- Numbers / Data

Competency 5:

The student will demonstrate an understanding of the concepts of momentum and center of mass by:

- Locating the center of mass of an objector a system of objects.
- Finding the momentum change resulting from an impulse.
- Solving collision problems using conservation of momentum in one or two dimensions.

Learning Outcomes

- Critical thinking
- Information Literacy
- Numbers / Data

Competency 6:

The student will demonstrate an understanding of rotational quantities by:

- Using the equations of rotational kinematics to calculate a later angular position and angular velocity for an object undergoing a constant angular acceleration.
- Calculating the moment of inertia fora symmetrical object.
- Finding the resultant torque caused by one or more forces acting on an object.
- Find the acceleration of a rotating object subject to torques.
- Find the kinetic energy of a rotating system.
- Solving a collision problem involving angular momentum.

Learning Outcomes

- Critical thinking
- Information Literacy
- Numbers / Data

Competency 7:

The student will demonstrate an understanding of the behavior of solids and fluids by:

- Applying equations of stress and strain.
- Finding the force generated by pressure at a given depth in a fluid.
- Solving statics problems involving buoyancy.
- Applying Bernoulli's equation to fluid flow.

Learning Outcomes

- Critical thinking
- Information Literacy
- Numbers / Data

Competency 8:

The student will demonstrate an understanding of harmonic motion by:

- Finding the angular frequency and period of oscillation for a mass subject to a linear restoring force.
- Finding the position, velocity, acceleration, and energies as functions of time for an object undergoing simple harmonic motion.

Learning Outcomes

- Critical thinking
- Information Literacy
- Numbers / Data