Professor: Luis A. Anchordoqui **PHY-168**

Physics-168: Introductory Physics I (calculus treatment) – Online course.

General Information:

This course is classified as "Zero Textbook Cost." The material for the course is available at the course website https://www.lehman.edu/faculty/anchordoqui/168.html

I will be posting weekly announcements on blackboard. Each week the same relevant information you would find on the course website will also be posted on blackboard.

The course consists of 13 modules. Each module has a synchronous lecture and a session of group discussion. Asynchronous participation in the discussion board forum is highly recommended. There will be 3 midterm exams (10/05/2021; 11/09/2021; 12/09/2021) and a comprehensive final exam (12/16/2021). At the end of each lecture, we will have a quiz related to the material of the previous module.

You must enroll separately in the laboratory accompanying this course. You will have a different instructor assigned to your lab. They will have additional instructions for you related to lab procedures (with a separate syllabus). At the end of the semester he/she will give me your grade. This will count as 20% of your overall grade. Attendance at the weekly laboratory is mandatory. More info on lab policy will be given during the first lab session. All lab sessions for PHY 168 start the week of August 30th.

The layout of the document is as follows. We first present the online course development plan. After that we describe the methodology for assessment of student coursework. Finally, we provide some guidelines on how to be successful in the course, and a summary calendar.

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Course Development Plan

Module 1 (Online)

Date: 08/26/2021 (Lecture) & 08/31/2021 (Group discussion)

Topic: ***Measurements and motion in one dimension***

Description: System of units, measurement and uncertainty, significant figures, position and displacement, average and instantaneous velocity, and average and instantaneous acceleration.

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapters 1 and 2 https://www.lehman.edu/faculty/anchordoqui/SJ1.pdf
  - Lecture notes
    - History and limitations of Classical Mechanics, https://www.lehman.edu/faculty/anchordoqui/chapter01.pdf
    - Units and Dimensional Analysis, https://www.lehman.edu/faculty/anchordoqui/chapter02.pdf
    - One dimensional kinematics https://www.lehman.edu/faculty/anchordoqui/chapter04.pdf
- Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.

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- Complementary material: Geometric interpretation of differentiation (video clips and lecture notes from MIT course 18.01SC). There are also problems with solutions for students to practice.

  https://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/

Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me

  Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_1.pdf
- ➢ Solve physics problems on kinematics in one dimension.

  Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems1p.pdf
- ➢ Group discussion of problem solutions.
- ➢ Written summary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.
- ➢ Welcoming video https://www.youtube.com/watch?v=MQzRfToQuTo

Reflective Questions:

- ✓ How are students connecting with you this week?
  - ☐ Q&A forum and email
- ✓ How are students connecting with each other this week?
  - ☐ Q&A forum
  - ☐ Discussion board forum (Module 1)
- ✓ How are students showing what they are learning this week?
  - ☐ Presentation of assessment problems in discussion session
  - ☐ Summary in a video using multimedia

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Module 2 (Online)

Date: 09/02/2021 (Lecture) & 09/14/2021 (Group discussion)

Topic: **Motion in two and three dimensions**

Description: Concepts of vectors, velocity vector, relative velocity, acceleration vector, projectile motion, horizontal range of a projectile

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- ➢ Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapters 3 and 4
    https://www.lehman.edu/faculty/anchordoqui/SJ1.pdf
  - Lecture notes
    - Vectors
      https://www.lehman.edu/faculty/anchordoqui/chapter03.pdf
    - Two dimensional kinematics
      https://www.lehman.edu/faculty/anchordoqui/chapter05.pdf
- ➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.
- ➢ Complementary material: Vectors and matrices (clip and lecture notes MIT course 18.02SC).
  https://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/

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Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me

  Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_2.pdf
- ➢ Solve physics problems of kinematics in two and three dimension.

  Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems2p.pdf
- ➢ Group discussion of problem solutions.
- ➢ Written summary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

- ✓ How are students connecting with you this week?
  - ☐ Q&A forum and email
- ✓ How are students connecting with each other this week?
  - ☐ Q&A forum
  - ☐ Discussion board forum (Module 2)
- ✓ How are students showing what they are learning this week?
  - ☐ Presentation of assessment problems in discussion session
  - ☐ Summary in a video using multimedia

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Module 3 (Online)

Date: 09/09/2021 (Lecture) & 09/21/2021 (Group discussion)

Topic: ***Newtonian dynamics***

Description: Newton's laws of motion. Inertial reference frame, mass, contact forces, normal force, frictional force, hook's law, free body diagrams, Newton's law of gravitation, drag forces

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- ➢ Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapter 5 https://www.lehman.edu/faculty/anchordoqui/SJ1.pdf
  - Lecture notes
    - Newton's laws of motion https://www.lehman.edu/faculty/anchordoqui/chapter07.pdf
    - Application of Newton's 2nd law https://www.lehman.edu/faculty/anchordoqui/chapter08.pdf
- ➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.

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Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me
  Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_3.pdf
- ➢ Solve various physics problems on Newtonian dynamics.
  Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems3p.pdf
- ➢ Group discussion of problem solutions.
- ➢ Written summary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

- ✓ How are students connecting with you this week?
  - Q&A forum and email
- ✓ How are students connecting with each other this week?
  - Q&A forum
  - Discussion board forum (Module 3)
- ✓ How are students showing what they are learning this week?
  - Presentation of assessment problems in discussion session
  - Summary in a video using multimedia

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Module 4 (Online)

Date: 09/23/2021 (Lecture) & 09/28/2021 (Group discussion)

Topic: ***Circular motion***

Description: Kinematics of uniform circular motion, centripetal acceleration, satellite motion, dynamics of uniform circular motion, tangential acceleration, highway curves (banked and unbanked), ultracentrifuge.

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- ➢ Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapter 6
    https://www.lehman.edu/faculty/anchordoqui/SJ1.pdf
  - Lecture notes
    - Circular motion
      https://www.lehman.edu/faculty/anchordoqui/chapter06.pdf
    - Circular motion dynamics
      https://www.lehman.edu/faculty/anchordoqui/chapter09.pdf
- ➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.

Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me

Contact information: luis.anchordoqui@lehman.cuny.edu

Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_4.pdf

- ➢ Solve problems on circular motion.

  Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems4p.pdf
- ➢ Group discussion of problem solutions.
- ➢ Written summary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

- ✓ How are students connecting with you this week?
  - Q&A forum and email
- ✓ How are students connecting with each other this week?
  - Q&A forum
  - Discussion board forum (Module 4)
- ✓ How are students showing what they are learning this week?
  - Presentation of assessment problems in discussion session
  - Summary in a video using multimedia

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Module 5 (Online)

Date: 09/30/2021 (Lecture) & 10/12/2021 (Group discussion)

Topic: ***Conservation theorem (energy)***

Description: Concept of work, the dot product, kinetic energy, potential energy (gravitational and elastic). Conservative and no conservative forces. Mechanical energy. Conservation of energy.

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- ➢ Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapters 7 and 8
    https://www.lehman.edu/faculty/anchordoqui/SJ1.pdf
    https://www.lehman.edu/faculty/anchordoqui/SJ2.pdf
  - Lecture notes
    - The energy and conservation of energy https://www.lehman.edu/faculty/anchordoqui/chapter13.pdf
    - Potential energy and conservation of energy https://www.lehman.edu/faculty/anchordoqui/chapter14.pdf
- ➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.
- ➢ Complementary material: Definite integrals an its applications (videos and lecture notes MIT course 18.01SC)

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https://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/

Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me
  Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_5.pdf
- ➢ Solve various problems in conservation of energy.
  Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems5p.pdf
- ➢ Group discussion of problem solutions.
- ➢ Written summary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

- ✓ How are students connecting with you this week?
  - Q&A forum and email
- ✓ How are students connecting with each other this week?
  - Q&A forum
  - Discussion board forum (Module 5)
- ✓ How are students showing what they are learning this week?
  - Presentation of assessment problems in discussion session
  - Summary in a video using multimedia

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Module 6 (Online)

Date: 10/07/2021 (Lecture) & 10/19/2021 (Group discussion)

Topic: ***Conservation theorems (momentum)***

Description: Conservation of momentum, particle scattering, center-of-mass, system of particles, impulse, rocket motion.

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- ➢ Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapter 8 https://www.lehman.edu/faculty/anchordoqui/SJ2.pdf
  - Lecture notes
    - Momentum, system of particles, and conservation of momentum https://www.lehman.edu/faculty/anchordoqui/chapter10.pdf
    - Momentum and the flow of mass https://www.lehman.edu/faculty/anchordoqui/chapter12.pdf
    - Collision theory https://www.lehman.edu/faculty/anchordoqui/chapter15.pdf
- ➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.
- ➢ Complementary material: Techniques of integration (videos and lecture notes MIT course 18.01SC)

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https://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/

Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me

  Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_6.pdf
- ➢ Solve problems on conservation of momentum.

  Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems6p.pdf
- ➢ Group discussion of problem solutions.
- ➢ Written summary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

- ✓ How are students connecting with you this week?
  - Q&A forum and email
- ✓ How are students connecting with each other this week?
  - Q&A forum
  - Discussion board forum (Module 6)
- ✓ How are students showing what they are learning this week?
  - Presentation of assessment problems in discussion session
  - Summary in a video using multimedia

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Module 7 (Online)

Date: 10/14/2021 (Lecture) & 10/26/2021 (Group discussion)

Topic: ***Rotational dynamics***

Description: Angular displacement, angular velocity, angular acceleration, rotational kinetic energy, moment of inertia, Steiner's theorem, torque, rolling, non-slip conditions, Atwood's machine.

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

➢ Reading Materials:

- "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapter 10.
  https://www.lehman.edu/faculty/anchordoqui/SJ2.pdf
- Lecture notes
  - Two dimensional rotational kinematics
    https://www.lehman.edu/faculty/anchordoqui/chapter16.pdf
  - Two dimensional rotational dynamics
    https://www.lehman.edu/faculty/anchordoqui/chapter17.pdf
  - Rigid body: translation and rotational motion kinematics for fixed axis rotation
    https://www.lehman.edu/faculty/anchordoqui/chapter20.pdf
  - Rigid body dynamics: rotation and translation about fixed axis rotation
    https://www.lehman.edu/faculty/anchordoqui/chapter22.pdf

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- Enrichment: Three dimensional rotation and gyroscopes

  https://www.lehman.edu/faculty/anchordoqui/chapter22.pdf

➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.

➢ Complementary material: The geometry of linear equations, matrices, and determinants (videos and lecture notes MIT course 18.06).

https://ocw.mit.edu/courses/mathematics/18-06sc-linear-algebra-fall-2011/

Assignments, Activities:

➢ Attend a live synchronous lecture and interact with me

Slides available @https://www.lehman.edu/faculty/anchordoqui/168_7.pdf

➢ Solve problems on rotational dynamics.

Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems7p.pdf

➢ Group discussion of problem solutions.

➢ Written summary of all problems

➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

✓ How are students connecting with you this week?

- Q&A forum and email

✓ How are students connecting with each other this week?

- Q&A forum
- Discussion board forum (Module 7)

✓ How are students showing what they are learning this week?

- Presentation of assessment problems in discussion session
- Summary in a video using multimedia

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Module 8 (Online)

Date: 10/21/2021 (Lecture) & 11/02/2021 (Group discussion)

Topic: ***Conservation theorems (angular momentum)***

Description: Vector nature of rotation, vector product, angular momentum, conservation of the angular momentum, angular momentum of a system of particles.

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- ➢ Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapter 11
    https://www.lehman.edu/faculty/anchordoqui/SJ2.pdf
  - Lecture notes:
    - Angular momentum
      https://www.lehman.edu/faculty/anchordoqui/chapter19.pdf
- ➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.

Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me
  Slides available @https://www.lehman.edu/faculty/anchordoqui/168_8.pdf
- ➢ Solve problems on applying conservation of angular momentum and angular momentum of a system of particles.

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Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems8p.pdf

- ➢ Group discussion of problem solutions.
- ➢ Written summary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

- ✓ How are students connecting with you this week?

  Q&A forum and email
- ✓ How are students connecting with each other this week?

  Q&A forum

  Discussion board forum (Module 8)
- ✓ How are students showing what they are learning this week?

  Presentation of assessment problems in discussion session

  Summary in a video using multimedia

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Module 9 (Online)

Date: 10/28/2021 (Lecture) & 11/16/2021 (Group discussion)

Topic: ***Static equilibrium***

Description: Conditions for equilibrium, center of gravity

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- ➢ Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapter 12. https://www.lehman.edu/faculty/anchordoqui/SJ2.pdf
  - Lecture notes:
    - Static equilibrium https://www.lehman.edu/faculty/anchordoqui/chapter18.pdf
- ➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.

Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me
  Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_9.pdf
- ➢ Solve problems on static equilibrium
  Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems9p.pdf
- ➢ Group discussion of problem solutions.

Contact information: luis.anchordoqui@lehman.cuny.edu

- ➢ Written summary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

- ✓ How are students connecting with you this week?
  Q&A forum and email
- ✓ How are students connecting with each other this week?
  Q&A forum
  Discussion board forum (Module 9)
- ✓ How are students showing what they are learning this week?
  Presentation of assessment problems in discussion session
  Summary in a video using multimedia

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Module 10 (Online)

Date: 10/28/2021 (Lecture) & 11/23/2021 (Group discussion)

Topic: ***Gravitation and the gravitational field***

Description: Kepler's laws and Newton synthesis, Newton's law of gravitation, gravitational field, gravitational potential energy, escape velocity, ocean tides

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- ➢ Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapter 13 https://www.lehman.edu/faculty/anchordoqui/SJ2.pdf
  - Lecture notes:
    - Celestial Mechanics https://www.lehman.edu/faculty/anchordoqui/chapter25.pdf
- ➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.

Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me
  Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_9.pdf
- ➢ Solve problems on celestial mechanics and gravitational field
  Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems10p.pdf
- ➢ Group discussion of problem solutions.

Contact information: luis.anchordoqui@lehman.cuny.edu

- ➢ Written Summary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

- ✓ How are students connecting with you this week?
  Q&A forum and email
- ✓ How are students connecting with each other this week?
  Q&A forum
  Discussion board forum (Module 10)
- ✓ How are students showing what they are learning this week?
  Presentation of assessment problems in discussion session
  Summary in a video using multimedia

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Module 11 (Online)

Date: 11/04/2021 (Lecture) & 11/30/2021 (Group discussion)

Topic: ***Fluids***

Description: Phases of matter, density and specific gravity, pressure, pressure in fluids, atmospheric pressure, gauge pressure, Pascal's principle, Archimedes principle, buoyancy force, fluids in motion, equation of continuity, Bernoulli's equation, viscosity, Poiseuille's equation, health threat from coronavirus airborne infection, Turbulence Reynolds number.

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.
4. Brainstorm on the latest concern happening in our world using cutting edge science to come up with real working solutions. Investigating how a virus transports through the air to come up with solutions to combat its devastation

Your Content:

- Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapter 14 https://www.lehman.edu/faculty/anchordoqui/SJ2.pdf
  - Lecture notes
    - Static fluids https://www.lehman.edu/faculty/anchordoqui/chapter27.pdf
    - Fluid dynamics https://www.lehman.edu/faculty/anchordoqui/chapter28.pdf
  - A physicist view of airborne infection (Anchordoqui-Chudnovsky, 2020); https://arxiv.org/abs/2003.13689

Contact information: luis.anchordoqui@lehman.cuny.edu

- Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.

Assignments, Activities:

➢ Attend a live synchronous lecture and interact with me

Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_10.pdf

➢ Solve problems on fluids mechanics

Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems11p.pdf

➢ Group discussion of problem solutions.

➢ Written Summary of all problems

➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

✓ How are students connecting with you this week?

Q&A forum and email

✓ How are students connecting with each other this week?

Q&A forum

Discussion board forum (Module 11)

✓ How are students showing what they are learning this week?

Presentation of assessment problems in discussion session

Summary in a video using multimedia

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Module 12 (Online)

Date: 11/11/2021 (Lecture) & 12/02/2021 (Group discussion)

Topic: ***Oscillations and waves***

Description: Simple harmonic motion, energy in simple harmonic motion, period and sinusoidal nature of simple harmonic motion, oscillating system, the pendulum, waves, types of waves, wave motion, speed of waves, sound waves, wave intensity, Doppler effect, sonic boom. Superposition and standing waves

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- ➢ Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapters 15, 16, 17, 18 https://www.lehman.edu/faculty/anchordoqui/SJ3.pdf
  - Lecture notes:
    - Simple harmonic motion. https://www.lehman.edu/faculty/anchordoqui/chapter23.pdf
    - Physical pendulum https://www.lehman.edu/faculty/anchordoqui/chapter24.pdf
- ➢ Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.
- ➢ Complementary material: Differential equations (lecture notes from MIT course18.03SC)

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https://ocw.mit.edu/courses/mathematics/18-03sc-differential-equations-fall-2011/

Assignments, Activities:

- ➢ Attend a live synchronous lecture and interact with me

  Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_11.pdf
- ➢ Solve problems on oscillatory and wave motion

  Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems12p.pdf
- ➢ Group discussion of problem solutions.
- ➢ Written Summeary of all problems
- ➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

- ✓ How are students connecting with you this week?

  Q&A forum and email
- ✓ How are students connecting with each other this week?

  Q&A forum

  Discussion board forum (Module 12)
- ✓ How are students showing what they are learning this week?

  Presentation of assessment problems in discussion session

  Summary in a video using multimedia

Professor: Luis A. Anchordoqui **PHY-168**

Module 13 (Online)

Date: 11/18/2021 (Lecture) & 12/07/2021 (Group discussion)

Topic: ***Kinetic theory of gases and thermodynamics***

Description: Atomic theory, temperature, Ideal gas law, Avogadro's number, kinetic theory and molecular interpretation of temperature, mean free path, heat. Thermodynamic system, Internal energy of the system, thermodynamic state, thermodynamic process, thermal equilibrium (zeroth law of thermodynamics), first law of thermodynamics, second law of thermodynamics, entropy, isochoric process, isobaric process, isothermal process, adiabatic process

Learning Objectives:

1. The educational methodology of this subject proposes first to integrate the domain of concepts and knowledge of physics from everyday life, its practical application, and the development of abilities and skills to solve example problems.
2. Among the specific purposes are the power to adequately characterize physics principles and/or laws discussed during the lectures.
3. Student discussion in interactive forums, which aim to improve the instrumental aspects learned through the lectures and experiences outside the walls.

Your Content:

- Reading Materials:
  - "Physics for Scientists and Engineers" (Serway-Jewett, 2014), Chapters 19, 20, 21 & 22.
    https://www.lehman.edu/faculty/anchordoqui/SJ3.pdf
  - Lecture notes:
    - Kinetic theory of gases: equipartition of energy and ideal gas law.

    https://www.lehman.edu/faculty/anchordoqui/chapter29.pdf
- Conceptual summary of thermodynamics: Understanding the wicked world that surrounds you (Anchordoqui and Anchordoqui, 2017) https://arxiv.org/abs/1711.07445.

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- Video Lecture: videos of the lectures and the group discussion will be posted in blackboard.

Assignments, Activities:

➢ Attend a live synchronous lecture and interact with me

Slide lecture available @ https://www.lehman.edu/faculty/anchordoqui/168_12.pdf

➢ Solve problems on thermal physics.

Downloadable @ https://www.lehman.edu/faculty/anchordoqui/problems13p.pdf

➢ Group discussion of problem solutions.

➢ Written Summary of all problems

➢ In relation to a problem assigned for a discussion session: create a short video summarizing the problem and solution, questions from other students, and my feedback.

Reflective Questions:

✓ How are students connecting with you this week?

Q&A forum and email

✓ How are students connecting with each other this week?

Q&A forum

Discussion board forum (Module 13)

✓ How are students showing what they are learning this week?

Presentation of assessment problems in discussion session

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Assessment of student coursework

The weekly activities of the courses are divided into lectures and recitations. The recitations are synchronous student presentations of assigned problems. In short, the student presenting the problem is the lead, and I play the role of the moderator between the lead and the class. Homework sets for group discussions are available on the course website. Each homework set consists of questions used as worked examples in lecture, questions covered during discussion, and questions assigned as homework exercises. The problem assignments will be done at the end of each lecture. Students will not be evaluated during the presentations to facilitate a smooth discussion between the class. Each student presenting a problem will post the solution on the Discussion Board Forum to open the debate about that particular problem. For selected problems, the students will create a short video summarizing the problem and solution, questions from other students, and my feedback. The students will be evaluated for the written solution, forum participation and the video clip. Three tests will be given during the semester (October 5, November 9, December 9). Each test will consist of 4 problems that you will have to solve in written format and send it via photo attachment. In addition, you should send a video clip explaining how you solved each problem. If your explanation is not thorough, there will be a zoom meeting with further questions about the problems in the exam.

There will be a comprehensive final exam; Thursday December 16 at 1:30 - 3:30 PM. The final will consist of 5 problems that you will also have to solve in written format, send via photo attachment, and explain how you solved each of these problems in a video clip. There could be additional questions via zoom meeting to finalize the grade. The final is mandatory and you are responsible for making sure that you can attend at this time.

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❖ **Grading policy.**

The overall course grade will be determined as follows:

- 10 % - quizzes, Q&A discussion, and video presentation of assigned problems.
- 45% - midterm exams (15% each)
- 25% - comprehensive final exam
- 20% - laboratory

Letter grades will be assigned according to the guidelines

- A = 90 - 100
- B = 80 - 90
- C = 65 - 80
- D = 50 - 65
- F = below 50

The cutoffs for +'s and -'s will be decided at the end of the semester.

Students will have a portfolio including all their work from the semester. By the end of the semester they will select from this portfolio what they think is the best solved problem with accompanying video. This will help to decide the cutoffs for +'s and -'s.

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How to be successful in Physics 168 - *PLEASE READ CAREFULLY –*

1. This is not an asynchronous course; attendance at lectures and discussions is highly encouraged. Indeed attendance will be taken at each class.
2. Make sure you visit the course website regularly. Check the announcements. You will have to download a set of problems every week. Two or three problems from each homework set will be selected at random for quizzes.
3. The importance of basic math cannot be over-emphasized. You absolutely must be comfortable with basic algebra, trig, arithmetic, and differential calculus. You are expected to handle problems that use only algebraic variables.
4. QUIZZES: a short (about 10-15 minutes) quiz based on the material covered in recent lectures will be given at the end of every lecture.
5. TESTS: test problems are loosely based on those you will find in the homework sets. Please note that this does not mean these problems will simply be repeated on tests. Please check the schedule of tests for conflicts with religious observance. Please let me know ASAP if you see any conflicts; a different time will be arranged so that you can take the test. Make-up tests will be given only for valid reasons.
6. Make sure you bring a scientific calculator to lecture and discussion. You will need a calculator during tests and quizzes.
7. Please contact me immediately if you think that a genuine mistake has occurred in the grading of tests. Clerical errors in grading will of course be rectified as soon as possible.
8. Students with special requirements/learning disabilities should contact me as early as possible during the semester. Note that it is the responsibility of students with special accommodations to contact the instructor as early as possible to make the appropriate arrangements for testing. Please note that I cannot allow students to take tests under conditions different from those experienced by the rest of the class (extra time, separate room, etc.) unless they have the appropriate paperwork (VISA form) from the Student Disability Services. The office of Student Disability Services will issue

formal instructions to me about how students with disabilities are to be accommodated.

I look forward to meeting you all and working together on the challenges we will face. It will be tough but in the end we will still have fun.

Calendar

Module 1: Measurements in one direction	Lecture: 08/26/2021 Group discussion: 08/31/2021
Module 2: Motion in two and three dimensions	Lecture: 09/02/2021 Group discussion: 09/14/2021
Module 3: Newtonian dynamics	Lecture: 09/09/2021 Group discussion: 09/21/2021
Module 4: Circular Motion	Lecture: 09/23/2021 Group discussion: 09/28/2021
MIDTERM 10/05/2021	
Module 5: Conservation Theorems (energy)	Lecture: 09/30/2021 Group discussion: 10/12/2021
Module 6: Conservation theorems (momentum)	Lecture: 10/07/2021 Group discussion: 10/19/2021
Module 7: Rotational Dynamics	Lecture: 10/14/2021 Group discussion: 10/26/2021
Module 8: Conservation theorems (angular momentum)	Lecture: 10/21/2021 Group discussion: 11/02/2021
MIDTERM 11/09/2021	
Module 9: Static equilibrium	Lecture: 10/28/2021 Group discussion: 11/16/2021
Module 10: Gravitation and the gravitational field	Lecture: 10/28/2021 Group discussion: 11/23/2021
Module 11: Fluids	Lecture: 11/04/2021 Group discussion: 11/30/2021
Module 12: Oscillations and waves	Lecture: 11/11/2021 Group discussion: 12/02/2021
Module 13: Kinetic theory of gases and thremodynamics	Lecture: 11/18/2021 Group discussion: 12/07/2021
MIDTERM 12/09/2021	
FINAL 12/16/2021	

Students who participate in this class with their camera on or use a profile image are agreeing to have their video or image recorded solely for the purpose of creating a record for students enrolled in the class to refer to, including those enrolled students who are unable to attend live. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during

class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.

Academic integrity is acting with honesty, respect, and responsibility in learning and in research. It is a moral code that binds us to do the right thing even when no one is looking.

Academic integrity is essential to any course, including this one _____. Students may fail to exhibit integrity by cheating, plagiarizing, obtaining unfair advantage, or falsifying records. In so doing, they hurt themselves, because they do not learn the material sufficiently and move on to later courses and careers as impostors, assumed to have skills they do not yet possess. They hurt their classmates, because they cheapen their hard-won accomplishments and disrupt the class. And they hurt future students, because the reaction to cheating will be to create ever stricter testing conditions.

Examples of academic dishonesty include but are not limited to those shown at http://lehman.smartcatalogiq.com/2019-2021/Undergraduate-Bulletin/Academic-Services-and-Policies/Academic-Integrity. For example, cheating on an exam includes, but is not limited to: Consulting with others regarding the exam while it is ongoing (this includes tutors, classmates, people who took the class before and family members etc.) and posting exam questions online for others to answer while the exam is ongoing, and including posting exam questions to online tutoring services such as Chegg. For online or hybrid courses, academic dishonesty also includes communicating in any form electronically or otherwise during an exam, sharing answers with peers electronically, or sharing screenshots of exam questions. Copying and pasting answers from the internet and not writing in own words or paraphrasing another's written statements. Additional rules may apply to specific exams. If so, they will be listed in the instructions for the exam.

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Academic dishonesty is a very serious issue and will not be tolerated for any lecture, lab, or research activity.

Cheating on an exam in this course: Should a student exhibit academic dishonesty, the instructor will inform the student of the suspicion, charges, and sanctions in writing. Any form of academic dishonesty will result in an F for the course, and a report to the College's Academic Integrity Officer, regardless of whether the cheating materially affected the score of the student in question.

Your pledge: To indicate that you understand academic integrity is central to the success of this course and your future success, you will be asked either to write out an honor statement during each exam or to confirm the receipt of this statement that has been approved and sponsored by the School of Natural and Social Sciences of Lehman College.

"I, _____ understand that academic integrity is central to the success of myself and others during this and future courses. The work I present here in this exam/ lab/homework is my own and is in my own words. I declare that I have fulfilled my responsibility as an honest student, and the work presented here is true representation of my ability in this course."

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