SCI120: Physics w/LAB

THIS COURSE DOES NOT REQUIRE A FINAL EXAM

SYLLABUS

READ THESE INSTRUCTIONS NOW!

Keep work organized by week, clearly labeled and typed or copy/paste onto your syllabus. Math and hand done projects: photograph, scan or screenshot and copy/paste to your syllabus. Keep images small so your file isn't too large to submit or save work as a PDF. Go to "Student Services" online for any issues with this course. If you need Microsoft Word, request an email from Student Services and follow the steps given to you.

- **SUBMITTING WORK: YOU MUST SUBMIT ALL WEEKS AT ONCE on one file. Your syllabus may be submitted separately if you chose not to add your work to it. Go to the website and select "Submit Work", complete the form and attach your work. You may also share a public link such as Gdocs. You have two attempts at receiving a passing grade of "C" or better so submit your full effort original work. Do not mail work. You will receive a reply in about 5 business days. Do not call or email asking for us to verify your work. All components of your course must be completed by the end of the 8th week from the time of your registration; 12 weeks for a 2 credit class. If you have a medical emergency or disability preventing you from completing your class, contact "Student Services" and send an email to request up to a 2-week extension**

ONLINE TEXTBOOK: http://www.physicsclassroom.com/Class/

ONLINE INTERACTIVE 3D VISUAL SUPPORT:

http://www.physicsclassroom.com/Physics-Interactives

Week 1

One Dimensional Kinematics - Chapter Outline

STUDY LESSONS 1 THRU 5

ASSIGNMENT: #2-5 only http://www.physicsclassroom.com/curriculum/1DKin/1DKin1.pdf

ASSIGNMENT: #4-7 only http://www.physicsclassroom.com/curriculum/1DKin/1DKin2.pdf

ASSIGNMENT: #1-5 ONLY http://www.physicsclassroom.com/curriculum/1DKin/1DKin3.pdf

ASSIGNMENT: # 1-4 only http://www.physicsclassroom.com/curriculum/1DKin/1DKin4.pdf

ASSIGNMENT: #2-3 only http://www.physicsclassroom.com/curriculum/1DKin/1DKin14.pdf

ADD WORKSHEET RESPONSE/S/ HERE

LAB

CREATE YOUR OWN EXPERIMENT

Galileo's Original Experiment

High school students can mimic Galileo's research: They can measure the speed of falling objects relating the time of the fall to the objects' weight and size. Use marbles made of various sizes but of the same material and drop them from the same height. They should reach the floor at the same time. Use a marble and a ball the same size, but of different material, to identify the impact of air resistance on falling objects.

Using the scientific method, share your project below.

Include photos of you doing your gravity project.

COMPLETE YOUR PHYSICS INTERACTIVES:

1-Dimensional Kinematics

Match an animated motion to a verbal description or a graphical description in the Name That Motion and Graph That Motion Interactives. Build a ramp along which a ball will roll in order for its motion to match a given graph with the Graph and Ramps Interactive. Earn your Rocket Scientist badge with the Two Stage Rocket Simulator. Combine the Accelerometer Interactive with the acceleration sensors on your mobile devices to measure the acceleration of your device. Learn how displacement and distance are different in the Vector Walk Interactive.

Visit 1-D Kinematics Interactives. **http://www.physicsclassroom.com/Physics-Interactives**

SUMMARIZE EACH INTERACTIVE:

Vectors, Projectiles and Two-Dimensional Motion

Learn important rules about adding vectors with the Vector Addition Interactive. Practice adding vectors by adding their components with the Name That Vectors Interactive. Be smart ... be fast ... and challenge your friends at the Vector Guessing Game. Use the Projectile Simulator to uncover some fundamental principles pertaining to motion in two dimensions. Practice your projectile problem-solving skills as you prevent Birdman from soiling the school football field in our Turd the Target and Turd the Target 2 projectile games. And explore an age-old question with the Monkey and Zookeeper Interactive.

Visit Vectors, Projectiles, and 2-D Motion Interactives:

http://www.physicsclassroom.com/Physics-Interactives

SUMMARIZE EACH INTERACTIVE:

WEEK 2: Newton's Law

STUDY LESONS 1 THRU 4

ASSIGNMENT: #1 and 7 - For #7 – list by "object A – D" from smallest to greatest inertia.
http://www.physicsclassroom.com/curriculum/newtlaws/newtl1.pdf

ASSIGNMENT: #2 & 9 only
http://www.physicsclassroom.com/curriculum/newtlaws/newtl3.pdf

ADD WORKSHEET RESPONSE/S/ HERE

LAB: SIMPLE PROJECT

PROBLEM: How does the height of a ramp affect potential energy of a car?

RESEARCH: Look up potential and kinetic energy in a science textbook or encyclopedia. Write two or three paragraphs in your own words.

HYPOTHESIS: At which height do you think the car will have the most potential energy?

MATERIALS: one small model car (Hot Wheels type)
one board – about one meter long and at least 12 cm wide

PROCEDURE:
1. Mark the board every 20 centimeters.
2. Stack several books and put the end of the board on top of the books. Use the board and books as a ramp for the car. Measure and record the height of the stack of books.
3. Send the car down the ramp and measure how far the car travels from the end of the board.
4. Repeat step 3 for a total of five trials. Calculate the average of distance traveled for the five trials.
5. Keep the length of the board the same, but change the number of books in the stack. Measure and record the height of the stack of books each time you change it.
6. Enrichment: How do you think the potential energy will change if you change the length of the ramp? Design an experiment, including procedure, to test this problem.

DATA: Record the data from each trial, including height of the books and average, in a data table.

Graph the average of the trials. Use height of stack as the independent variable and distance traveled as dependent variable.

CONCLUSION: This is not optional. You must explain what you learned by doing this activity. Remember that you must answer the question you asked in your original problem statement.

ADD REPORT HERE

COMPLETE YOUR PHYSICS INTERACTIVES:

Newton's Laws of Motion

Explore relationships pertaining to applied force, friction force, mass, and acceleration with the Force Interactive. Practice your skill of constructing free-body diagrams with the Free Body Diagram Interactive. Learn about Newton's second law of motion with the Rocket Sled and Skydiving Interactives. Find out why you feel weightless and weighty with the Elevator Ride Interactive. Use our Atwood's Machine simulator to explore the role of hanging masses and pulleys upon the acceleration of objects.

Visit Newton's Laws Interactives. **http://www.physicsclassroom.com/Physics-Interactives**

SUMMARIZE EACH INTERACTIVE:

Week 3: Work, Energy and Power

STUDY LESSONS 1 AND 2

ASSIGNMENT: #1-2 only **http://www.physicsclassroom.com/curriculum/energy/energy4.pdf**

ASSIGNMENT: #3-5 only **http://www.physicsclassroom.com/curriculum/energy/energy2.pdf**

Momentum and Its Conservation - Chapter Outline

Lesson 1: The Impulse-Momentum Change Theorem

ASSIGNMENT: Do PROBLEMS #1 – 6 only
http://www.physicsclassroom.com/curriculum/momentum/mom1.pdf

ADD WORKSHEET RESPONSE/S/ HERE

SIMPLE LAB

Energy Transfer through Balls

Energy is constantly changing forms and transferring between objects, try seeing for yourself how this works. Use two balls to transfer kinetic energy from the the big ball to the smaller one and see what happens

What you'll need:

- A large, heavy ball such as a basketball or soccer ball
- A smaller, light ball such as a tennis ball or inflatable rubber ball

Instructions:

1. Make sure you're outside with plenty of room.
2. Carefully put the tennis ball on top of the basketball, holding one hand under the basketball and the other on top of the tennis ball.
3. Let go of both the balls at exactly the same time and observe what happens.

What's happening? Explain what is happening

ADD YOUR RESPONSE HERE

COMPLETE YOUR PHYSICS INTERACTIVES:

Momentum and Collisions

Conduct an Egg Drop study and learn about factors affecting the collision force. Investigate collisions with the Cart and Brick Interactive. Study momentum conservation with the Fish Catch and Exploding Carts Interactives. Explore collision and explosion principles like never before with the Colliding Carts Interactive.

Visit Momentum and Collisions Interactives. **http://www.physicsclassroom.com/Physics-Interactives**

SUMMARIZE EACH INTERACTIVE:

Work and Energy

Investigate force and work with the It's All Uphill Interactive. Learn how speed affects stopping distance with the Stopping Distance Interactive. Build a coaster or use a pre-built coaster to explore the physics of roller coasters with the Roller Coaster Model. Practice your skill with work-energy bar charts using the Chart That Motion Interactive. Explore the conservation of mechanical energy with our Vibrating Spring simulator.

Visit Work and Energy Interactives. **http://www.physicsclassroom.com/Physics-Interactives**

SUMMARIZE EACH INTERACTIVE:

Week 4: Electricity

Static Electricity - Chapter Outline

Lesson 1: Basic Terminology and Concepts

ASSIGNMENT: #3-4 only http://www.physicsclassroom.com/curriculum/estatics/static1.pdf

ASSIGNMENT: #1 & 3 only **http://www.physicsclassroom.com/curriculum/estatics/static4.pdf**

ADD WORKSHEET RESPONSE/S/ HERE

STUDY: Current Electricity

LAB I:

Purpose

To find out how static electricity is produced. After this experiment you will be able to differentiate static electricity from current electricity and answer the question, "What kind of electricity is produced when you rub two materials of different kinds?"

Additional information

There are two kinds of electricity namely static and current electricity. Static electricity or electricity at rest is a kind of electricity produced when you rub and stroke two different materials especially non-metals. They attract light objects such as small bits of paper and cotton thread to them. It is a form of electricity that does not flow but stays fixed on a certain location. It is very different from electricity that flows in wires like the one used to operate our appliances at home. Rubbing materials causes electrons to move. This results in materials becoming positively or negatively charged. Objects having opposite charges attract while those with the same charges repel. In addition, static electricity is produced by friction and is only present temporarily.

Required materials

comb
small pieces of paper

dry woolen cloth
inflated balloon
sand

Estimated Experiment Time

Around 15 minutes.

Step-By-Step Procedure

1. Bring your comb near small pieces of paper and observe what happens.
2. Now rub your comb briskly with a dry woolen cloth.
3. Bring the comb towards some tiny pieces of paper and write down your observation.
4. Rub an inflated balloon with a woolen cloth.
5. Put the balloon against the wall and observe what happens.
6. Rub the balloon with the woolen cloth again.
7. Hold the balloon over very dry fine sand.

Note

Make sure you perform the experiment in an enclosed area to prevent sand and paper from getting carried away by wind. Be careful not to play with the sand since it can get into your eyes.

Observation

What happened when you bring your comb near small pieces of paper? What happened when you rubbed your comb with the cloth and brought it near the pieces of paper? Compare your observation with the first step. What caused the balloon to stick on the wall? Do you think the same thing will happen without rubbing the balloon on the cloth first? What happens to the sand when you bring the balloon near it? What kind of electricity is produced?

ADD YOUR LAB REPORT WITH PICTURES OF YOU DOING YOUR LAB HERE

LAB II

MAKE A SIMPLE CIRCUIT: WATCH https://www.youtube.com/watch?v=INBYuA6KoLA

Purpose

To construct a simple electric circuit and identify its parts. After this experiment, you will be able to name the parts of the simple electric circuit and answer the question, “When does electricity flow in the circuit?”

Additional information

Current electricity is a form of electricity that flows out of electrical outlets. It delivers great amount of electricity that can harm you just like lightning. Electric current consists of electrons flowing in a conductor such as a metal wire. Electricity is a form of energy and it can also be transformed. An electric current moves along a conductor. The complete path taken by electric current is called a circuit. A simple electric circuit is made up of several parts. For electrons to flow in the wire there must be a source of power to give them a push just like a dry cell. It will allow electrons to flow in the wire. In return, the metal wire acts as a conductor that allows the electrons to move easily to and from the dry cell. The switch controls the flow of electron through the circuit and at the same time opens and closes the circuit. The bulb is the device which transforms electricity to light. The circuit is closed or complete when the electrons flow from the source and back again. On the other hand, the circuit is open when there is a break in the circuit and electricity does not reach the bulb.

Required materials

half meter copper wire cut into three
dry cell
small flashlight bulb with socket
switch
electrical tape
scissors

Estimated Experiment Time

Approximately 20 minutes

Step-By-Step Procedure

1. Get three pieces of copper wire and remove about half a centimeter of insulation at both ends.
2. Attach one wire to the positive side of the dry cell and secure it with electrical tape.
3. Then attach the other end to the right side of the light bulb.
4. Get another wire and tape it on the negative side of the dry cell.
5. Attach the other end to the left side of the switch.
6. Get the last piece of wire and wound it to the right side of the switch.
7. Next, attach it to the left side of the light bulb.

Note

Remove the insulator slowly to avoid cutting or damaging the wires. Do not play with the light bulb; it is made of very light materials. Avoid touching the bulb especially if it lights up because its surface can become hot.

Observation

How did you open and close the circuit? When you loosen the bulb and turned on the switch, what happened? What happened when you tighten the bulb and remove one of the wires? Does the bulb light up or not? What happens to the flow of electricity if a part in the circuit is missing?

ADD YOUR LAB REPORT WITH PICTURES OF YOU DOING YOUR LAB HERE

COMPLETE YOUR PHYSICS INTERACTIVES: **Static Electricity**

See the otherwise unseen with our Aluminum Can Polarizaation simulation. Learn about the law that governs the force acting between charged objects with the Coulomb's Law Interactive. Explore charging methods with the Charging simulation or the Name That Charge skill-builder activity. Explore the complex set of electric field lines that surround a single charge or a configuration of charges with the Electric Field Interactive. Use charge interactions and field forces to guide a*charged puck* into the goal in the Put the Charge in the Goal Interactive. And explore the electric potential around a charged object with our Electrostatics Landscape Interactive.

Visit Static Electricity Interactives. **http://www.physicsclassroom.com/Physics-Interactives**

SUMMARIZE EACH INTERACTIVE:

Electric Circuits

Build a circuit. Add a resistor or a light bulb and a meter to measure current or voltage drops. Tap/click a battery or resistor to change its voltage or resistance. Build single-resistor circuit and study the voltage-current-resistance relationship. Or build a series, parallel or combination circuit and explore how they work. Study just about anything and everything pertaining to electric circuits with the DC Circuit Builder Interactive.

Visit Electric Circuits Interactives. **http://www.physicsclassroom.com/Physics-Interactives**

SUMMARIZE EACH INTERACTIVE:

Week 5: Waves

Study each lesson on Waves, Sound & Light

ASSIGNMENT: #1-3 only **http://www.physicsclassroom.com/curriculum/waves/waves1.pdf**

ADD WORKSHEET RESPONSE/S/ HERE

COMPLETE YOUR PHYSICS INTERACTIVES: **Waves and Sound**

Explore the nature of a wave and the relationship between waves and sound with the Simple Wave Simulator. Study the motion of waves on a string and the effect of tension, density and damping upon their behavior with the Slinky Lab Interactive. Create standing waves and investigate their patterns with the Standing Wave Maker Interactive.

Visit Waves and Sound Interactives: **http://www.physicsclassroom.com/Physics-Interactives**

SUMMARIZE EACH INTERACTIVE:

WEEK 6

ONLINE REASONING ASSIGNMENTS

http://www.physicsclassroom.com/reasoning

The Physics Classroom Science Reasoning Center

The activities are worksheets that consist of reading passages accompanied by questions. The worksheets are organized by the physics topics shown below. The passages and accompanying questions engage students in a variety of types of tasks. These tasks fall into the broad categories of interpreting data, analyzing experiments, and evaluating models and theories.

The development of science reasoning skills is an essential aspect of an effective science education. Most physics teachers will quickly agree that our courses involve more than the dispensing of knowledge.

- 1-D Kinematics
- Newton's Laws
- Projectiles
- Momentum
- Energy
- Circular Motion

SUBMIT ANSWERS TO EACH REASONING ASSIGNMENT. ORGANIZE AND LABEL YOUR WORK

WEEK 6

ONLINE REASONING ASSIGNMENTS

http://www.physicsclassroom.com/reasoning

The Physics Classroom Science Reasoning Center

Continued

- Electrostatics
- Circuits
- Waves
- Sound
- Light

SUBMIT ANSWERS TO EACH REASONING ASSIGNMENT. ORGANIZE AND LABEL YOUR WORK.

MY BEST TO YOU!