Physics Workshops for PHY 1010 and PHY 1030

1. **Get Ready for Physics**
   This workshop is designed to help students gain the prerequisite skills required to succeed in first year physics courses. Topics covered include significant figures, unit conversions, rearranging algebraic equations, and vectors and trigonometry.

2. **One- and Two- Dimensional Kinematics**
   This workshop will focus on one- and two- dimensional kinematics problems. An organized and effective problem-solving strategy will be introduced and utilized to solve kinematics problems of varying difficulty.

3. **Circular Motion**
   This workshop will focus on circular motion. Students will learn how to convert from linear to circular quantities and use both linear and circular kinematics equations to solve problems.

4. **Practice Midterm 1 (PHY 1010 & PHY 1030)**
   This midterm review is designed for students enrolled in Physics I and Introductory Physics in preparation for their first midterm exam. Students will have the opportunity to write a practice midterm during the first half of this workshop, and problems will be taken up together during the second half. Topics covered include one- and two-dimensional kinematics, circular motion, and forces.

5. **Forces with One Object**
   This workshop will focus on drawing free-body diagrams with one object, and using these diagrams to determine net force and acceleration. Concepts covered include static and kinetic friction, normal forces, scale readings, tension, ramps, and acceleration.

6. **Forces with Multiple Objects**
   This workshop will focus on drawing free-body diagrams with more than one object, and using these drawings to determine net force and acceleration. Problems incorporate pulleys, static and kinetic friction, ramps, and kinematics equations.

7. **Practice Midterm 2 (PHY 1030)**
   This midterm review is designed for students enrolled in Introductory Physics in preparation for their second midterm exam. Students will have the opportunity to write a practice midterm during the first half of this workshop, and problems will be taken up together during the second half. The focus of this practice midterm is on forces with one or more objects.

8. **Forces with Circular Motion**
   This workshop allows students to make connections between forces and circular motion, two concepts discussed in previous workshops. Students will investigate forces required to produce circular motion, including normal forces, static friction, and tension.

9. **Impulse, Momentum, and Energy**
   This workshop will focus on elastic and inelastic collisions, conservation of momentum, as well as conservation of energy. Various forms of energy will be considered including gravitational potential, kinetic, and spring energy.
10. **Practice Midterm 2 (PHY 1010)**
   This midterm review is designed for students enrolled in Physics I in preparation for their second midterm exam. Students will have the opportunity to write a practice midterm during the first half of this workshop, and problems will be taken up together during the second half. The focus of this practice midterm is on forces with one or more objects, conservation of momentum, forces with circular motion, energy, and work.

11. **Work**
   This workshop will focus on work; problems will include an external force acting on or by a system. A systematic approach will be introduced to deal with energy balances that incorporate work.

12. **Rotation of a Rigid Body**
   This workshop will focus on rotation. Concepts covered include moment of inertia, center of mass, angular velocity, pulleys without negligible mass, and conservation of angular momentum.

13. **Practice Midterm 3 (PHY 1030)**
   This midterm review is designed for students enrolled in Introductory Physics in preparation for their third midterm exam. Students will have the opportunity to write a practice midterm during the first half of this workshop, and problems will be taken up together during the second half. The focus of this practice midterm is on energy, work, and circular motion.

14. **Gravity**
   This workshop will focus on gravity. Concepts covered include forces of gravity, gravitational potential energy, and escape velocity.

15. **Physics Marathon Exam Review (PHY 1010 and PHY 1030)**
   This full day exam review is designed for students enrolled in Physics I and Introductory Physics in preparation for their final exam. Topics learned throughout the term will be covered, including kinematics, circular motion, forces, momentum, energy, work, rotation, and gravity. Students will have the opportunity to write two practice exams, and problems will then be taken up together.

**Physics Workshops for PHY 1020 and PHY 1040**

1. **Charges**
   This workshop will focus on electric charges, and their effect on objects. Vector addition will be used to determine the net electric force on a point charge.

2. **The Electric Field**
   In this workshop, the similarities and differences between electric force and electric field will be examined. Vector addition, as well as integration will be used to determine the net electric field at a point.
3. **Gauss’s Law**
   In this workshop, Gauss’s Law will be used to find the electric field both inside and outside of charged spheres and cylinders. Charge distributions of conductors and insulators will be analyzed, and described by their linear, surface, and volume charge densities.

4. **The Electric Potential**
   The focus of this workshop will be on electric potential. Problem-solving strategies incorporating electric potential and conservation of energy will be used to solve problems about the motion of charged particles. The definition of capacitance will also be used to determine the charge of and potential difference across capacitors connected in parallel and series in a circuit.

5. **Practice Midterm 1 (PHY 1020 & PHY 1040)**
   This midterm review is designed for students enrolled in Physics II and Physics for Biosciences in preparation for their first midterm exam. Students will have the opportunity to write a practice midterm during the first half of this workshop, and problems will be taken up together during the second half. Topics covered include charges, electric field, Gauss’s law, and electric potential.

6. **Fundamentals of Circuits**
   This workshop will focus on DC circuits containing resistors connected in parallel and series. Ohm’s law and Kirchhoff’s loop law will be used to find the potential difference across and current through each resistor.

7. **The Magnetic Field**
   This workshop will focus on the magnetic field and its ability to exert forces on moving charged particles. The Biot-Savart law will be used to determine the magnetic field produced by a moving point charge and by a short current element. The magnetic force on a moving charge and on a current carrying wire will be calculated, and the direction this force acts will be determined using the right-hand-rule.

8. **Electromagnetic Induction**
   The focus of this workshop will be on Lenz’s law and Faraday’s law. These laws will be used to determine the induced emf and current produced by a changing flux, as well as the direction of this induced current.

9. **Practice Midterm 2 (PHY 1020)**
   This midterm review is designed for students enrolled in Physics II in preparation for their second midterm exam. Students will have the opportunity to write a practice midterm during the first half of this workshop, and problems will be taken up together during the second half. Topics covered include circuits, the magnetic field, and electromagnetic induction.

10. **Practice Midterm 2 (PHY 1040)**
    This midterm review is designed for students enrolled in Physics for Biosciences in preparation for their second midterm exam. Students will have the opportunity to write a practice midterm during the first half of this workshop, and problems will be taken up together during the second half. Topics covered include resistance and resistivity, capacitors and dielectrics, RC circuits, right-hand-rule, Ohm’s law, and Kirchhoff’s loop law.
11. **AC Circuits (PHY 1020)**

The focus of this workshop is on AC circuits, a topic that is only covered in Physics II (not Physics for Biosciences). The effect of frequency on capacitive and inductive reactance will be investigated, and used to explain the mechanism behind high-pass and low-pass RC filter circuits. RLC circuits will be analyzed to determine the current through and potential difference across each circuit element both at resonance as well as at other frequencies.

12. **Optics**

This workshop will focus on wave and ray optics. Interference patterns due to single slit, double slit, and diffraction gratings will be examined. Snell’s law will then be used to determine the angle of refraction as light passes from one medium into another. Ray diagrams as well as thin lens equations will also be used to determine the properties and location of images formed by a thin lens or mirror.

13. **Physics II Exam Review (PHY 1020)**

This exam review is designed for students enrolled in Physics II in preparation for their final exam, and is split between two days, approximately one week apart. The first part of this review will focus on charges and electric field; however, students will be given the entire review package which includes the remaining topics learned throughout the term, including Gauss’s law, electric potential, magnetic field, electromagnetic induction, AC circuits, and optics. Students are encouraged to prepare for the second part of the review workshop by completing the entire review package independently. Problems will then be taken up during the second part of the review workshop and students will have the opportunity to ask questions or seek clarification on topics they had difficulty with.

14. **Physics for Biosciences Exam Review (PHY 1040)**

This midterm review is designed for students enrolled in Physics for Biosciences in preparation for their final exam. Students will have the opportunity to write a practice exam during the first half of this workshop, and problems will be taken up together during the second half. Topics covered include electric force, field, and potential, Gauss’s law, Ampere’s law, Kirchhoff’s loop law, Faraday’s law, as well as wave and ray optics.