COURSE CODE: LBYPHOA

COURSE TITLE: Physics Fundamentals for Engineering Majors 1 Laboratory (Online)

DEPARTMENT: Physics

TEXTBOOK:

• Manual of each experiment can be found in the AnimoSpace in Canvas.

READING LIST/ TEXTBOOK REFERENCES:

- Young, H. and Freedman, R. (Latest Edition). University physics with Modern Physics (15th edition). Pearson
- Walker, J. (Latest Edition). Physics. Boston: Pearson Education.
- Giambattista, A., Richardson, B. and Richardson, R. (Latest Edition). Physics. McGraw Hill.
- Griffith, T., & Brosing, J. (Latest Edition). The physics of everyday phenomena: a conceptual introduction to physics. New York: McGraw-Hill Education.
- Cutnell, J., Johnson, K., Young, D. and Stadler, S. (Latest Edition). Physics. Wiley and Sons.
- Hewitt, P. (2015). Conceptual Physics (12th edition). Boston: Pearson.
- Halliday, D., Resnick, R: and Walker J. (Latest Edition). Fundamentals of physics. New York: John Wiley and Sons.
- Serway, R. and Jewett, J. (Latest Edition), Physics for scientists and engineers with modern physics. Chicago: Saunders College Publishing.
- Giancoli, D. Latest Edition. Physics: principles with applications. Singapore: Pearson Education Asia Pte Ltd.

READING LIST/ ONLINE RESOURCES:

- Physlets at University of Colorado, Boulder. <u>https://phet.colorado.edu/en/simulations/category/physics</u>
- Phyphox (remote measurement):
 - o <u>https://phyphox.org/remote-control/</u>
 - o <u>https://www.youtube.com/watch?v=mPUHCW ypn9M</u>
- Arduino Science Journal: <u>https://support.arduino.cc/hc/en-us/sections/360004584459-Science-Journal-App</u>
- Errors and Acoustics: <u>https://phyphox.org/experiment/acoustic-stopwatch/</u>
- Simple Pendulum:
 - https://phyphox.org/wiki/index.php/Experiment:_Pendulum
 - o https://www.youtube.com/watch?v=xY3NFcDG3ZU
- Sonar: <u>https://www.youtube.com/watch?v=Ebj3v701HE0&feature=youtu.be</u>
- MATLAB Academy (campus-wide license): <u>https://matlabacademy.mathworks.com/</u>
 - Matlab Onramp: <u>https://matlabacademy.mathworks.com/details/matlab-onramp/gettingstarted</u>
 - Matlab Fundamentals: <u>https://matlabacademy.mathworks.com/details/matlab-</u><u>fundamentals/mlbe</u>

REQUISITE EQUIPMENT/MATERIALS FOR THE COURSE:

<u>General</u>

- Smartphone that can install the Physics Apps listed below.
- Physics Experiment Mobile Apps (freeware)/Software (online):
 - PHYPHOX <u>https://phyphox.org/download/</u>
 - o Arduino Science Journal <u>https://www.arduino.cc/education/science-journal</u>
 - o KSTools

Android: <u>https://play.google.com/store/apps/details?id=de.appzer.kstools&hl=en</u> OS: <u>https://apps.apple.com/us/app/kstools-com-tools-and-more/id909742373</u>

- Physics Toolbox Sensor Suite (supplementary) <u>https://www.vieyrasoftware.net</u>
- Matlab Mobile (Android): <u>https://www.mathworks.com/help/matlabmobile_android/ug/install-</u> matlab-mobile-on-your-device.html
- o Matlab Online: https://www.mathworks.com/products/matlab-online.html
- PC with internet access (remote monitoring, data acquisition, and plotting)
- Tape measure
- Ruler
- Adhesive tape

Simple Pendulum

- Paper tube (tissue tube) or small plastic bag (support for your phone)
- Rubber band (if you are using the paper tube)
- String

<u>Sonar</u>

- Box / echo shield for the mobile phone (e.g., foam, box container that can fit your mobile phone, which shields all directions from phone except the speaker and microphone location).
- Sound reflector material (i.e., hard, and flat material, e.g., tray)
- Support for the reflector that will hold it in a vertical position (optional)

Light Intensity

- Light source (e.g., a light bulb. Do **not** use laser)
- Phone holder (optional; for a stable measurement)
- Nonreflective cover (optional; to cover reflective surfaces along the measurement path)

Converging Lens

- Magnifying glass
- Adhesive tape (to secure your bond paper)
- Clamp for the magnifying glass (to make the magnifying glass vertical)
- Phone holder (optional; for a stable measurement)
- Box (to hold the bond paper(s) in vertical position)

Note:_Materials/Supplies for For Ohm's Law and Kirchhoff's Laws may be purchased from

e-Gizmo online shop: https://shopee.ph/search?keyword=physics%20electrical&shop=237034143

(e-Gizmo Physics Electrical Package 2 with DMM or e-Gizmo Physics Electrical Package 1)

Ohm's Law, Power, and Resistivity

- Set of 1/4W carbon resistors
- 10-kΩ trimmer potentiometer
- Breadboard
- Set of wire-connectors for breadboard
- DMM
- Regular pencil without eraser (graphite lead encased in wood)
- Micrometer caliper if available (or android/ios app)

Kirchhoff's Laws, Total Power, Principle of Superposition, and Introduction to Matlab

- Two 510-ohm and one 1,000-ohm carbon resistors.
- 1.5V and 3.0V-Battery Modules
- Breadboard
- Jumper wires
- Digital multimeter
- Cellphone with MATLAB or PC with internet access