I. PLACE: The lab will be conducted in research laboratories, changing based on topic

II. TEXTBOOK: None. Lab notes, references, and application notes will be posted on website.

III. COURSE OBJECTIVES:

A student has to be prepared for the lab in advance and become familiar with:
- basic scientific concepts behind the experiment,
- goals of the experiment,
- detailed plan of the experiment,
- the equipment involved,
- operation instructions,
- safety measures.

IV. COURSE STRUCTURE:

This 3 credit hour modern physics lab course is oriented for graduate and advanced undergraduate students majoring in physics. Course prerequisite: PHYS 305 and 355 with grade of C or better. The goal of the course is to introduce students to modern methods in experimental research and provide them with basic skills to carry out experiments. The course is based on a sequence of at least 6 labs. Therefore, there is no make up for a missed lab. The experiments will be chosen from the following:

- Basics of and obtaining vacuum
- Leak tests
- Sputtering and coatings
- Thin film deposition
- Thin film characterization
- Micro- and nano- devices
- Device fabrication and characterization
- Useful lab practices - materials fabrication, cutting, safety, and safety equipment
- Gas absorption
- X-ray diffraction
- Magnetic properties
- Differential scanning calorimetry
- Dynamic mechanical analysis
- FT-IR spectroscopy
- Thermogravimetric analysis
- Atomic absorption spectroscopy
There will be quizzes to check the preparedness and knowledge of the student. After admission to the lab, the students will conduct the lab together with the instructor. It is required that all necessary notes and data are collected by the student during the experiments.

**No FOOD, open toed shoes, shorts, WiFi devices, or cell phones permitted.**

**Discussion:** Every other week a discussion pertaining to the upcoming lab will be held.

**Homework Assignments:** Project report assignments will be given after completion of the every lab. The report is due in one week. It will be turned in on the course website using the Dropbox.

In any case in which an absence will occur, you need to use the proper University form (Undergraduate Student Absence Form For University-Approved Activities) to request an accommodation from the instructor. *This form must be presented to the instructor before the absence occurs (except in the medical emergency situation).*

**V. GRADES:**

(a) Grade Breakdown:  
- Project reports: 80%  
- Quizzes: 20%

(b) Grade Scale:  
- A: 90-100%  
- B: 80-89.9%  
- C: 70-79.9%  
- D: 55-69.9%  
- F: 0-54.9%

**VI. THE COURSE WEBSITE: SIU Online (https://online.siu.edu/)**

You must go to the above website, sign in, and follow the links to the PHYS 450 site. On the site you can get the following:

1. Notes
2. Important announcements
3. Grades!
4. The syllabus
5. My office hours.
6. Links to interesting physics sites

**VII. CONTACT:**

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