

PHYSICS 6450 - Winter 2015

Introduction to Materials and Device Characterization

INSTRUCTOR: Jian Huang (313-577-0564); OFFICE: 385 Physics, jianhuang@wayne.edu
TIME for lectures: T, Th 9:35 – 11:00 PM. Room: 177 Physics
Lab: Th 1:35 -3:45 PM
TEXT: Materials Characterization, 2nd Edition by Yang Leng ISBN: 978-3 – 527-33463-6
REFERENCE: Characterization of Materials (Journal by Wiley), workshops, etc.
COURSE WEB PAGE: WSU Blackboard
PRE-REQUISITE: PHY217/218 (Halliday Resnick). Suggested co-requisites: PHY7050/ECE5500

Introduction: This course deals with modern techniques used in the characterization of materials and devices. A number of techniques based on diffraction, microscopy, spectroscopy, optical, magnetic, and electrical properties will be discussed. For each technique, the basic principles, the information that can be obtained using the technique, and an introduction to the practicalities of the technique will be provided, either by the instructor or by guest lecturers who are experts in the field. One of the goals of this course is to provide students with the tools necessary to design and implement experiments for their own graduate research projects.

Students will be required to participate in the laboratory sessions, where a first-hand experience into each technique will be provided. For each experiment the students will complete laboratory reports (format will be discussed in class). At the end of the semester, groups of 3 students each will complete a research project based on the presented techniques, in which they perform 2-3 characterization experiments on a sample or device. The results of the project will be written up in a report, and an oral presentation will be given.

Grades: [Note: There are no exams in this course]

Grading: Laboratory Reports:	30%	Technical Report:	20%
Oral Presentation:	30%	Quizzes:	20%

Laboratory notebooks: Students will participate in 10 laboratory sessions where they experience first-hand many of the techniques discussed in the lecture. Students will collect data and write lab reports. The lab reports consist of answering questions about the technique used, the samples, data interpretation and analysis and conclusion. Questions will be provided during the lab session. Each student will maintain a bound lab notebook to record all the lab reports. Each lab will be 3% of the total grade of the course. The lab notebook grade will also be based on neatness, organization/ presentation of data etc. **NO MAKE-UP LAB SESSIONS.**

Project and Technical Report: In the last three weeks of the class, student teams will be formed of 3 students each. These teams will find a project title and develop a strategy of choosing samples and characterization techniques. Each team should use at least 2-3 techniques discussed in the class or any other relevant characterization technique. Then, each team must carefully characterize samples and collect all relevant data. The teams will then prepare technical reports on their findings, which should be written as if submitted to a technical/ scientific journal. They should include a review of the relevant background literature, experimental methods, results, and discussion, as well as all relevant plots, tables etc.

Oral Presentation: Each team will present their work in form of an oral presentation, similar to a presentation given at a scientific meeting. Every student will be allotted the same amount of time for their presentation. There will be short question & answer sessions. Grades will be based on knowledge and presentation style.

- The topic is due February 16.
- Each talk is 18 minutes long + 3 minutes of Q&A.

- Though there is no fixed format for the presentation, each talk must include a clear background and introduction, review of relevant works, description of your approach (and results if applicable), and a summary.
- The style of the presentation will be graded as well.
- Drafts, due April 24, will allow the instructor to provide input.
- Evaluation (instructor: 75%; students: 25%)

Quizzes: There will be unannounced short quizzes during class.

Office Hours:

I encourage you to take advantage of the office hours from early on. If it is impossible for you to make it to the listed hours, you can contact me through email so that a time can be set to meet.

In-class policies

Out of consideration for the other students in the lecture please abide by the following rules of conduct: (1) Turn off all cell phones while in lecture, (2) Please arrive on time for lecture and do not leave early, (3) Please be mindful of your classmates.

Academic dishonesty

All of the graded assignments are designed to measure your individual understanding of the material. No forms of cheating on these graded assignments will be tolerated (working together on the homework assignments are not considered cheating but copying of someone else's homework is). Anyone found cheating on any graded activity will receive a grade of zero for that part of their grade, and may receive a failing grade for the course. Use of a cell phone or texting device during an exam will be considered to be prima-facie evidence of cheating.

Students with disabilities

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577- 3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please be aware that a delay in getting SDS accommodation letters for the current semester may hinder the availability or facilitation of those accommodations in a timely manner. Therefore, it is in your best interest to get your accommodation letters as early in the semester as possible.