West Chester University, Department of Physics

PHY481: Introduction to Nanomaterials Lab (S-20)

Prof. Brandon Mitchell Room SSS-402A e-mail: bmitchell@wcupa.edu

MEETING TIME: Thursday 11:30 - 1:30 (MER122 and other places…)

Office Hours: My office hours for Spring 2020 are:

M: 3 – 4 **Th: 2- 3:30** **F: 1 - 2**

Occasionally I may be able to meet outside of regular office hours, please email me.

Required Course Materials

- ✓ a laboratory notebook (a bound, quad-ruled, composition notebook will do)
- ✓ a scientific calculator with trigonometric functions

Course Web Page: **D2L**

Course information can be found here throughout the semester. The syllabus, journal readings and example data will be found here.

Content: The laboratory part of PHY481 is designed to complement the lecture portion of the course. The goals of the laboratory section are (1) to provide you with a concrete and hands-on experiments that are standard practice for exploring and characterizing material systems at the nano- and micro- scale, and (2) to provide you with more advanced skills in data analysis and "error" analysis using a standard data analysis software IGOR™.

Guidelines for Office Hours: You set the agenda for office hours. Come with questions about the lecture, reading, homework, exams, grading, or anything else of concern or interest. Attend in groups or as an individual. If you would like to discuss something in private, please make a separate appointment. When multiple people are present, people will alternate asking questions. **Note:** You must demonstrate some effort/thought process towards an answer on homework problems before coming to see me. "I have no idea where to begin" is not an acceptable opening statement.

Attendance: You are expected to come to every lab, attendance will be taken. You will be allowed to miss one lab throughout the semester without penalty. For all other labs, only valid excuses as dictated by the student handbook will be accepted.

Phone Policy: Don't have them out and don't look at them!

Lab Work Flow

The first four lab meetings will be more lecture style, where information on the measurement and analysis technique are described, you need to know what the technique is before you do it! In other lab meetings, you will work in groups of three on a particular lab. As the equipment is research-grade and expensive, there is only one set-up for each experiment. Therefore, you will have to take turns completing the experiment, and once you have completed the experiment, you are expected to use one of the computers in MER114 equipped with IGOR to analyze the data.

Laboratory Assessment: Your "grade" for the laboratory section of PHY481 will be based on your performance on the laboratory exercises and the post-lab assignments. The laboratory section of the course consists of:

- One high-resolution XRD experiment and a TEM Experiment performed at the CMIRT.
- Two laboratory experiments that will be performed and analyzed by you and your group.
- 2-3 Data Analysis tasks where you will be given data and asked to analysis and explain it.

You must submit all work that is due for a particular lab period upon entering lab, not at the start of lab, not during lab, but as you walk through the door. I will setup a deposit box for your work at the door.

Also, sentences that are rendered false by grammatical error will receive no credit.

Lab Homework: There will be several assignments throughout the semester, which will range from a written assignment to turning in a one-page summary of your data and analysis. There will not be an assignment every week, and **I will always announce an assignment at least one week before it is due**.

Presentations: Each Student will give a 12- 15 presentation on one of the experiments performed by their group.

Grading: Your lab course grade is based on Attendance: 10%, Homework: 35%, Presentation: 30%, Participation in Labs: 25%.

A letter grade will be assigned based on performance in the course according to the following scale:

Grade	Quality Points	Percentage Equivalents	Interpretation
A	4.00	93-100	Excellent
A-	3.67	90-92	
B+	3.33	87-89	Superior
B	3.00	83-86	
B-	2.67	80-82	
C+	2.33	77-79	Average
C	2.00	73-76	
C-	1.67	70-72	
D+	1.33	67-69	Below Average
D	1.00	63-66	
D-	0.67	60-62	
F	0	< 60%	Failure

Refer to the Undergraduate Catalog for description of NG (No Grade), W, Z, and other grades.

Straight percentages will be given for all work, with the mid-semester and final grade based on overall class performance. Other considerations will influence your final grade including, class participation, class and laboratory attendance, and seeking timely guidance during office hours. Any student achieving at a level of 'C-' or below will be given an estimated grade on their mid-term deficiency grade report.

E-Mail and Communication: The best way to contact me is via e-mail. But, be aware that I will only read and respond to e-mails written in proper English, with correct grammar, spelling, and etiquette. Do not send me any e-mails addressed to “hey” or “yo,” like you would text a buddy or close friend.

“It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your

university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course."

ACADEMIC & PERSONAL INTEGRITY: It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Undergraduate Handbook, the Undergraduate Catalog, the *Ram's Eye View*, and the University website at www.wcupa.edu.

STUDENTS WITH DISABILITIES: If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University's Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. The OSSD hours of Operation are Monday – Friday, 8:30 a.m. – 4:30 p.m. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at www.wcupa.edu/ussss/ossd.

EXCUSED ABSENCES POLICY FOR UNIVERSITY-SANCTIONED EVENTS: Students are advised to carefully read and comply with the excused absences policy for university-sanctioned events contained in the WCU Undergraduate Catalog. In particular, please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

REPORTING INCIDENTS OF SEXUAL VIOLENCE: West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator, Ms. Lynn Klingensmith. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University protection of minors policy. Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at the webpage for the Office of Social Equity at http://www.wcupa.edu/_admin/social.equity/.

EMERGENCY PREPAREDNESS: All students are encouraged to sign up for the University's free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

ELECTRONIC MAIL POLICY: It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.

PHY481 - Lab Schedule (Tentative)
Week 1
Introduction & Overview **Basics of XRD**
Week 2
Atomic Force and Electron Microscopy
Week 3
SPIE Photonics West….No Class
Week 4
EELS and Atom Probe Tomography
Week 5
Photoluminescence
Week 6
CMIRT DAY
Week 7
Experiment Rotation: AFM and PL
Week 8
Spring Break…No Class
Week 9
Experiment Rotation: AFM and PL
Week 10
Experiment Rotation: AFM and PL
Week 11
Experiment Rotation: AFM and PL
Week 12
Data Analysis of PL and XRD
Week 13
Data Analysis of PL and XRD
Week 14
Presentations
Week 15
Presentations
Week 16
Nothing! Study for the Lecture Exam