

**ENVR373 Methods in Microscopy
Fall 2016**

**Lecture: M 3:50pm – 5:30pm
Lab: W or F 3:50pm – 5:30pm**

Instructor: James Perkins
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124B Rhoades Robinson Hall

Office Hours: MW 10:00-11:30am
R 12:00-2:00pm

Brittani McNamee
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140 Rhoades-Robinson Hall

M 1:00pm – 3:00pm
R 1:00pm – 3:00pm

Text: Library readings, handouts and materials in the SEM lab. Most readings will be from Goldstein et al., Scanning Electron Microscopy and X-ray Microanalysis and will be made available in the lab or via Moodle.

Grading:	Percent	Due Date
Practical Exam	30%	Oct. 31
Lab Assignments	15%	one week after assigned
Portfolio	15%	Nov. 22
Project and Presentation	40%	Dec. 6 (UGR) / Dec. 14 3:30 (Final Exam)
Abstract for Perkins/McNamee	*	Oct. 31
Abstract Due to URP	*	Nov. 7
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Total	100%	

*Required but no grade associated

Using the Equipment:

Plan ahead and do not wait until the last minute to do your work. The machines **will** go down for various reasons (blown filament, system-lockup...) and these are not excuses for late work. Remember – Lack of planning on your part does not constitute an emergency on my part. We cannot and will not come and install a new filament at a moment's notice. If any equipment goes down send both James and Brittani an e-mail and we will take care of the problem ASAP.

You will need to reserve the SEM before going over to the lab. This is done on the SEM Google calendar and will save you a lot of frustration. You will receive an email with a link to this calendar. The XRD is available on a first come - first serve basis. Do not use the machine for longer than an hour at a time to enable everyone a chance to use it. Other equipment is available by appointment only. Even though you have reserved equipment you may get bumped by the field engineer for service. Here is the priority for the equipment (pecking order!): service engineer, classes, all others.

Practical Exam:

You will be tested on both your knowledge of the topics covered in the lectures as well as how to use the SEM and/or XRD. The practical exam will be a pre-scheduled session with either James or Brittani where you will be asked to demonstrate how to perform certain functions on the SEM and/or XRD and answer some verbal questions about topics covered in the lectures.

Lab Assignments:

Take home exercises on data and image analysis are due within one week of being assigned.

Portfolio:

You will be expected to practice using the equipment and turn in a portfolio of your work. The portfolio will need to contain the following and you can complete them in any order. The sample should be the one that you will work with on your class project. If you do not have a class project, the instructors have several samples you may use.

1. An optical micrograph of your sample using a reflected or transmission microscope. All images must contain a scale. You will need to schedule use in advance with Brittani. This image is important because without it, you may have a hard time navigating around your sample on the SEM.
2. Electron micrographs of your sample using at least two detectors on the SEM. The magnification should be approximately the same for each of the micrographs.
3. Four SEM micrographs of the same specimen and same scale (one each) at 1kv, 5kv, 10kv, 30kv with the detector of your choice.
4. One electron micrograph using the detector of your choice with one X-ray analysis report included. If your sample is not suitable for X-ray analysis, one can be provided.
5. One X-ray diffraction spectra with the main phases labeled and identified. If your sample is not suitable for X-ray diffraction, one can be provided.

You will be graded on the quality of the images you present and the organization of those images. All micrographs need to be labeled, include a brief description, and contain the set-up parameters. You will turn in the portfolio via email to both Brittani and James.

Project and Presentation:

ALL students are required to turn in a project abstract to the instructors by Oct. 31. All students must attend the presentations during Finals and at least 2 presentations at UGR.

Research Students: Your presentation at the Undergraduate Research Symposium will satisfy this requirement. Note that the abstract to apply for this symposium is due on November 7th. See <https://urp.unca.edu/> for information on how to apply.

Non-research Students: You will give a 15-minute presentation during the Final Exam time on Dec. 14 at 3:30pm on how at least one of the analysis methods discussed in class is used in a project of your choice and the pros and cons of using each method.