

# Research in Physics II (50:750:492)

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**Course Description:** Research in Physics II is a writing intensive course focused on developing skills that are important in any research setting. Every researcher needs to be experienced in finding peer reviewed articles, comprehending scientific writing, and communicating scientific ideas through writing and oral presentation. In this course we will further develop these skills by focusing on popular characterization techniques. In particular, we will focus on transmission electron microscopy, atomic force microscopy, and scanning electron microscopy. You will become familiar with the theory and operation of the instrument, the kinds of samples that are suitable for the technique, and recent interesting research implementing these techniques.

## Important Information:

Use the links below to create a RefWorks account. We will be using this to organize important peer reviewed journals. You can use the second link to download a plug in for Word, which will make it much easier to create references. The last link is where you will find the course website. We will be using Canvas for all communication, access to course materials, and assignment submissions.

RefWorks ProQuest: <https://refworks.proquest.com/>

RefWorks Word Add-In: [LINK](#)

Course Website: <https://canvas.rutgers.edu/>

## Learning Goals:

- Learn how to use the Rutgers Data Base for peer reviewed literature
- Become familiar with RefWorks to organize references
- Practice comprehending scientific articles and building knowledge within an unfamiliar field
- Develop scientific writing skills
- Develop a detailed understanding of commonly used characterization techniques.
- Develop oral presentation skills.

## Course Outline

### Module 1: Getting Started (2 weeks)

- Picking a characterization technique to study
- Finding research articles utilizing chosen technique

### Module 2: Theory and Operation (2 weeks)

- Physics of characterization technique
  - Components of instrument
  - Principles of operation
  - Information that can be obtained

Module 3: Special techniques (2 weeks)

- Find at least three special techniques that your instrument can be used for
- Find 1 research paper that utilizes each technique and summarize the paper.

Module 4: Cost of Instrument, Maintenance, and consumables (2 weeks)

- Create a spread sheet of the various options of different instruments.
  - Cost
  - Advantages & Disadvantages

Module 5: Presentation (5 weeks)

- Each student will create a video presentation about their technique.
- Each student will create a quiz on their video presentation.
- The quizzes will be taken by all other students.

**Grading**

- Short Assignments 20 %
  - Finding Papers
  - Quizzes
- Writing Assignments 30 %
  - Open-Ended Questions
- Presentation 50 %
- Total 100 %

Grading Rubric

A : 90-100%	B+ : 87-89%	B : 80-86%	C+ : 76-79%
C : 67-75%	D : 55-66%	F : <55%	