



# Advanced Characterization Techniques for Materials Research

The University of Toledo  
(College of Natural Science and Mathematics)  
(PHYS 6980/8980)

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<b>Instructor:</b>	Yanfa Yan	<b>Class Location:</b>	R1 2000
<b>Email:</b>	yanfa.yan@utoledo.edu	<b>Class Day/Time:</b>	TR 2:00-3:30pm
<b>Office Hours:</b>	100:00AM-12:00pm (MWF)	<b>Lab Location:</b>	N/A
<b>Office Location:</b>	R1 2100D	<b>Lab Day/Time:</b>	N/A
<b>Office Phone:</b>	419 530 3918	<b>Credit Hours:</b>	3
<b>Term:</b>	Spring, 2016		

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## COURSE/CATALOG DESCRIPTION

*Learning the principles and applications of advanced characterization techniques for materials research.*

## COURSE OVERVIEW

*Techniques include: imaging techniques, structural determination, electron emission spectroscopy, UV-visible emission, mass and optical spectroscopy, neutron diffraction, measurement of semiconductors.*

## STUDENT LEARNING OUTCOMES

*Students are expected to understand the fundamentals of the advanced characterization techniques for materials research.*

## TEACHING STRATEGIES

*The teaching will include class lecture and office hour Q&A (face-to-face) and presentation. Students are welcome to have face-to-face Q&A or course-related conversation at anytime.*

## PREREQUISITES AND COREQUISITES

*No requirement*

## REQUIRED TEXTS AND ANCILLARY MATERIALS

*No required text book*

## TECHNOLOGY REQUIREMENTS

*None*

## UNIVERSITY POLICIES

*Policy Statement on Non-Discrimination on the basis of Disability (ADA)*

*The University is an equal opportunity educational institution. Please read [The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.](#))*

## Academic Accommodations

*The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the [Student Disability Services Office.](#))*



## **GRADING**

### ***Midterm Grading***

50

### ***Final Grading***

50%.

## **COURSE SCHEDULE**

*(Insert a detailed course schedule/calendar that (1) includes weekly topics; (2) aligns the topic to be covered with the student learning outcome; and (3) describes in detail how you will assess student learning.)*

### **Approximate Lecture Schedule**

	Tuesday (2:00-3:30pm)	Thursday (2:00-3:30pm)
Jan	12	14
	19 (Imaging Techniques (Yanfa))	21 Imaging Techniques (Yanfa)
	26	28 Imaging Techniques
Feb	2 Special topics	4 Special topic/Electron beam Instrument
	9 Electron beam Instrument	11 Structural Determination
	16 Structural Determination	18 Electron Emission Spectroscopies
	23 Electron Emission Spectroscopies	25 X-Ray Emission Techniques
March	1 X-Ray Emission Techniques	3 Visible/UV Emission, Reflection, and Absorption
	8 (Spring Break)	10 (Spring Break)
	15 Visible/UV Emission, Reflection, and Absorption	17 Vibrational Spectroscopy and NMR
	22 Vibrational Spectroscopy and NMR	24 Ion Scattering Techniques
	29 Ion Scattering Techniques	31 Mass and Optical Spectroscopy
April	5 Mass and Optical Spectroscopy	7 Mass and Optical Spectroscopy
	12 Mass and Optical Spectroscopy	14 Neutron and Nuclear Techniques
	19 Neutron and Nuclear Techniques	21 Physical and Magnetic Properties
	26 Measurement of Semiconductors	28 Measurement of Semiconductors
	28 Final presentation	