



## Fundamentals of Modern Physics – Fall 2019

The University of Toledo  
(College of Natural Science and Mathematics)  
(PHYS 6140/7140)

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<b>Instructor:</b>	Yanfa Yan	<b>Class Location:</b>	MH 4012
<b>Email:</b>	yanfa.yan@utoledo.edu	<b>Class Day/Time:</b>	MWF 9:00-9:55am
<b>Office Hours:</b>	12:00-2:00pm (MWF)	<b>Lab Location:</b>	N/A
<b>Office Location:</b>	MH4002	<b>Lab Day/Time:</b>	N/A
<b>Office Phone:</b>	419 530 3918	<b>Credit Hours:</b>	3
<b>Term:</b>	Fall, 2019		

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### COURSE/CATALOG DESCRIPTION

*Thermal radiation and Plank's postulate, Photons-particle-like properties of radiation, De Broglie's postulate, Bohr's model of the atom, Schroedinger's theory of quantum mechanics, Solutions of time-independent Schroedinger equation, One-electron atom, Magnetic dipole moments, spin, and transition rates, Multielectron atoms-ground states and X-ray excitations, Multielectron atoms-optical excitations, Quantum statistics, Molecules, Solids-Conductors and semiconductors, Solids-Superconductors and magnetic properties, Nuclear models, Nuclear decay and nuclear reactions, Introduction to elementary particles.*

### COURSE OVERVIEW

*Present clear and valid treatments of the properties of almost all of the important quantum systems from the point of view of elementary quantum mechanics.*

### STUDENT LEARNING OUTCOMES

*Students are expected to understand the fundamentals of the quantum physics of atoms, molecules, solids, nuclei, and particles*

### TEACHING STRATEGIES

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

### PREREQUISITES AND COREQUISITES

*Undergraduate level [PHYS 3320](#) Minimum Grade of D- and Undergraduate level [PHYS 3410](#) Minimum Grade of D-*

### REQUIRED TEXTS AND ANCILLARY MATERIALS

*Text: Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, Robert Eisberg and Robert Resnick (second Edition)*

### 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**

Homework:	20%	
Midterm 1 (Sept. 28):	20%	(Chapters 1-4)
Midterm 2 (Oct. 29):	20%	(Chapters 5-8)
Midterm 3 (Nov. 21):	20%	(Chapters 9-11)
Midterm 4(Final) (Dec. 7):	20%	(Chapters 12-15)

**COURSE SCHEDULE**

(schedule subject to change)

Month	Monday		Wednesday		Friday	
August	26	Chapter 1	28	Chapter 1/2	30	Chapter 2
September	2	Labor Day	4	Chapter 3	6	Chapter 3
	9	Chapter 4	11	Chapter 4	13	Chapter 5
	16	Chapter 5	18	No class (for qualifying)	20	No Class (for qualifying written/9/22)
	23	Chapter 6	25	Chapter 6	27	Midterm 1
	30	Chapter 6/7	2	Chapter 7	4	Chapter 7/8
October	7	Chapter 8	9	Chapter 8	11	Fall break
	14	Midterm 2 (5-8)	16	Chapter 9	18	Chapter 9
	21	Chapter 10	23	Chapter 10	25	No class (CdTe meeting)
	28	Chapter 11	30	Chapter 11	1	Chapter 12
November	4	Chapter 13	6	Chapter 13	8	Chapter 13
	11	Veteran’s day	13	Midterm 3	15	Chapter 14
	18	Chapter 15	20	Chapter 16	22	Chapter 16
December	25	Chapter 17	27	Chapter 17	29	Thanksgiving
	3	No class (MRS)	5	No class (MRS)	7	No class (MRS)



	9	Chapter 18	11 (8:00-10:00am)	Final	13	
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Fall 2019 PHYS 6140/7140 homework

- Ch.1: 5, 8, 10, 19
- Ch.2: 8, 9, 17, 29
- Ch.3: 5, 15, 30, 34
- Ch.4: 6, 10, 33, 36, 40
- Ch.5: 3, 7, 24, 27
- Ch.6: 2, 7, 18, 30
- Ch.7: 7, 13, 20
- Ch.8: 4, 6, 10
- Ch.9: 4, 8, 14, 19, 25
- Ch.10: 4, 6, 9, 20
- Ch.11: 4, 11, 26, 28
- Ch.12: 4, 10, 12, 24
- Ch.13: 7, 9, 10, 27
- Ch.14: 2, 11, 15, 17
- Ch.15: 3, 5, 7, 11, 13, 17