

**Boston University Study Abroad  
at  
Technische Universität Dresden  
Spring 2013  
Modern Physics (PY 313)**

**Lecturer**

	Dr. Olga Novgorodova	
E-Mail	<a href="mailto:novgorodova@gmail.com">novgorodova@gmail.com</a>	
Office	ASB K09	
Phone	TBA	
Time	Mon 16:40 - 18:10	Thu 13:00 - 14:30
Location	Mon HSZ/103/U	Thu SE2/102/U

(Drop-ins, calls, appointments, e-mail welcome anytime)

**Discussion**

TA	Dr. Frank Seifert	
E-Mail	<a href="mailto:F.Seifert@physik.tu-dresden.de">F.Seifert@physik.tu-dresden.de</a>	
Office	ASB E07	
Phone	463 34287	
Time	Wed 13:00 - 14:30	
Location	HSZ/E01/U	

(Drop-ins, calls, appointments, e-mail welcome anytime)

**Laboratory**

TA	Dr. Frank Seifert				
E-Mail	<a href="mailto:F.Seifert@physik.tu-dresden.de">F.Seifert@physik.tu-dresden.de</a>				
Office	ASB E07				
Phone	463 34287				
Time	see laboratory schedule				
Laboratory	MOD	AE	AS	ED	PE
Location	PHY D210	PHY D018	PHY D308	PHY D307	PHY D310

(Drop-ins, calls, appointments, e-mail welcome anytime)

**Pre-Lab**

TA	Dr. Frank Seifert	
E-Mail	<a href="mailto:F.Seifert@physik.tu-dresden.de">F.Seifert@physik.tu-dresden.de</a>	
Office	ASB E07	
Phone	463 34287	
Time	Mo 09:20 - 10:50 even weeks (see pre-lab schedule)	
Laboratory	pre-lab	
Location	SE2/22/U	

(Drop-ins, calls, appointments, e-mail welcome anytime)

## **Course Material**

Textbook: Thornton, Rex "Modern Physics", Fourth Edition,  
Brooks/Cole-Thomson Learning

Laboratory: Modern Physics lab packet (to be distributed)  
a bound notebook with square grid pages for lab reports

## **Course Requirements**

This course is devoted to the basic quantum mechanical concepts and phenomena required for a fundamental understanding of the world around us: atoms, molecules, electromagnetic waves, the structure and properties of materials. These phenomena and concepts are far from everyday experience and require thorough studying in order to be grasped fully. It is highly advisable to read the assigned text both before and after active participation in the lectures (listening attentively, taking notes, and asking questions). The assignments in this course should not be the starting point of your real work. Advance preparation, reading and lecture attendance are required.

## **Assignments**

A list of assigned problems is part of the course schedule. Assignments for week (n) have to be handed in on Monday, week (n+1) after the lecture. They will be discussed on Wednesday, week (n+1). Assignments handed in after the deadline will not be accepted. Your papers will be marked. You should be prepared to present your solution on the blackboard. A presentation on the blackboard will result in extra credits.

Discussion sessions start in the first week of classes. At the end of some discussion sessions there might be a quiz. You cannot make up for a missed quiz. You are strongly encouraged to ask questions during the discussion sessions to improve your understanding of Modern Physics. Attendance at all scheduled discussion sessions is compulsory.

## **Laboratory**

Attendance at all scheduled laboratories is compulsory. You are expected to participate in the pre-lab, read the instructions and complete any pre-lab assignments before you arrive at the lab. Use a bound lab book with a square grid on each page to record all data, observations, interim analyses, unusual procedures, and difficulties encountered. You must have the teaching assistant sign your work before you leave the lab. You are expected to prepare your report at home and submit it at the next regularly scheduled lab at the latest. The report must consist of:

1. A brief summary of the purpose of the experiment and the experimental approach taken;
2. Well-organized tables of the raw data that you obtained and intermediate results derived from it, including appropriate graphs;
3. A clear statement of your final results with an assessment of the factors affecting their accuracy;

4. Answers to all questions asked in the lab packet;
5. A brief discussion of what you personally learned from doing the experiment.

We do not accept reports submitted electronically; however, printed reports can be pasted into your note book.

If you missed a lab, you must present a documented reason (e.g. illness) in order to make up for it. Arrange an appointment with the TA. Note that only *one* lab can be made up for.

### **Academic Conduct**

All work during exams or quizzes must be your own unaided effort. The assignments that you submit must be your own final product, although discussion of strategies and numerical results with others is acceptable. Each member of a lab group must take her/his own notes, answer any questions in her/his own words, and write her/his own summarizing essay. In all other cases, active cooperation and peer teaching among students is strongly encouraged.

### **Assessment**

Your grade will be based on your total score consisting of the following components with the indicated weighting:

Midterm Exam	20%	May, 30th instead of lecture
Final Exam	30%	July, 17th instead of lecture (cumulative)
Assignments and Quizzes	20%	based on all assignments and discu. sess.
Laboratories	30%	based on all experiments

# Course Schedule

Lectures: Mon HSZ/103/U 16:40-18:10; Thu SE2/102/U 13:00-14:30

Discussion Session Wed. HSZ/E01/U, 13:00 - 14:30

Week	Date	#	Topic	Chapter
15	Mon April 8	1	Introduction/ Relativity	1, 2
	Wed 10	2	Discussion session	
	Thu 11	3	Relativity	2
16	Mon 15	4	Quantum Theory of Light	3
	Wed 17		Discussion session	
	Thu 18	5	Quantum Theory of Light	3
17	Mon 22	6	Particle Nature of Matter	4
	Wed 24		Discussion session	
	Thu 25	7	Particle Nature of Matter	4
18	Mon 29	8	Matter Waves	5
	Wed May 1		Holiday	
	Thu 2	9	Matter Waves	5
19	Mon 6	10	Quant. Mech. in One Dim.	6
	Wed 8		Discussion session	
	Thu 9		Holiday	
20	Mon 13	11	Quant. Mech. in One Dim.	6
	Wed 15		Discussion session	
	Thu 16	12	Hydrogen Atom	7
21	Mon 20		Holiday	
	Wed 22		Discussion session	
	Thu 23	13	Hydrogen Atom	7
22	Mon 27	14	Quant. Mech. in Three Dim.	6
	Wed 29		Discussion session	
	Thu 30		Midterm Exam	
23	Mon June 3	15	Quant. Mech. in Three Dim.	6
	Wed 5		Discussion session	
	Thu 6	16	Atomic Structure	8
24	Mon 10	17	Atomic Structure	8
	Wed 12		Discussion session	
	Thu 13	18	Molecular Structure	10
25	Mon 17	19	Lasers	10
	Wed 19		Discussion session	
	Thu 20	20	Statistical Physics	9
26	Mon 24	21	Statistical Physics	9
	Wed 26		Discussion session	
	Thu 27	22	Semiconductors	11
27	Mon July 1	23	Semiconductors	11
	Wed 3		Discussion session	
	Thu 4	24	Nucl. Struct. and Elem. Part.	13/15
28	Mon 8	25	Nucl. Struct. and Elem. Part.	13/15
	Wed 10		Discussion session	
	Thu 11			
29	Mon 15			
	Wed 17		Final Exam	
	Thu 18			

## Experimental Laboratory 2013

MOD	Millkan's Oil Drop	PHY D210
PE	Photo Effect	PHY D310
ED	Electron Diffraction	PHY D307
AS	Atomic Spectra	PHY D308
AE	Atomic Excitation	PHY D018

Date			Time	Place	Exp.	Group
Mon	April	15	09:20 - 10:50	SE2/22/U	prelab MOD	all
Tue	April	16	11:00 – 14:00	PHY D210	MOD	A, B, C
Tue	April	16	14:30 – 17:30	PHY D210	MOD	D, E, F
Tue	April	16	16:30 – 19:30	PHY D210	MOD	G, H
Mon	April	29	09:20 - 10:50	SE2/22/U	prelab PE	all
Tue	April	30	11:00 – 13:30	PHY D310	PE	C, D
Tue	April	30	13:30 – 16:00	PHY D310	PE	A, B
Tue	April	30	16:30 – 19:00	PHY D310	PE	E, F
Tue	April	30	16:30 – 19:00	PHY D310	PE	G, H
Mon	May	13	09:20 - 10:50	SE2/22/U	prelab ED	all
Tue	May	14	11:00 – 13:00	PHY D307	ED	E, F
Tue	May	14	13:00 – 15:00	PHY D307	ED	G, H
Tue	May	14	15:00 – 17:00	PHY D307	ED	A, B
Tue	May	14	17:00 – 19:00	PHY D307	ED	C, D
Mon	May	27	09:20 - 10:50	SE2/22/U	prelab AS	all
Tue	May	28	11:00 – 14:00	PHY D308	AS	G, H
Tue	May	28	14:00 – 17:00	PHY D308	AS	E, F
Tue	May	28	17:00 – 20:00	PHY D308	AS	A, B
Tue	May	28	16:30 – 19:30	PHY D308	AS	C, D
Mon	June	10	09:20 - 10:50	SE2/22/U	prelab AE	all
Tue	June	11	11:00 – 14:00	PHY D018	AE	C, D
Tue	June	11	14:00 – 17:00	PHY D018	AE	A, B
Tue	June	11	17:00 – 20:00	PHY D018	AE	E, F
Tue	June	11	16:30 – 19:30	PHY D018	AE	G, H
Tue	June	25	08:00 - 12:00		fall back date	

Manual MOD: <https://iktp.tu-dresden.de/uploads/media/millikan2013.pdf>

Manual PE: <https://iktp.tu-dresden.de/uploads/media/photoeffect2013.pdf>

Manual ED: <https://iktp.tu-dresden.de/uploads/media/electrondiffraction2013.pdf>

Manual AS: <https://iktp.tu-dresden.de/uploads/media/atomicspectra2013.pdf>

Manual AE: <https://iktp.tu-dresden.de/uploads/media/atomicexcitation2013.pdf>

Required: Bound lab book with squared grid, Calculator, Pen, Ruler