

Dr. Rama Balasubramanian (a.k.a) Dr. Bala

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Office Hours: WF 11am-12 noon; T Th: 1-2 pm; Other Hours: By Appointment

Course Overview: This course is a calculus based, rigorous introduction to modern physics. The students will be able to understand the fundamentals of scientific ideas and principles of physics, through lectures, homework, quizzes, class discussions and exams. The students will also engage in discussions and apply the underlying concepts to solve problems and understand the way things work. The students will also develop a scientific approach to solving physics problems using calculus and through a thorough grasp of the fundamental physics principles.

Learning Outcomes: Upon completion of this course, successful students will be able to

- Understand the wave-particle duality of matter and uncertainty principle
- Make connections to wave phenomena and fundamental nature of matter
- Apply mathematical approach in understanding the behavior of a quantum particle in different potentials
- Describe atomic structure and in atomic processes based on fundamental quantum rules
- Describe nuclear structure and discuss applications of nuclear physics
- Describe principles of relativity

Prerequisites: Phys 202, Math 121

Course Materials:

- Required Book: Modern Physics For Scientists and Engineers: 3rd Edition, Stephen Thornton and Andrew Rex. (You can also use the more expensive 4th Edition).
- Required Homework Access: You also need to purchase an access code for homework from Webassign. (Details are listed on the last page of this handout)
- Recommended Book : Modern Physics: 3rd Edition, Raymond A. Serway, Clement J. Moses and Curt A. Moyer., Thomson/Brookscole (2005)
- Principles of Physics, 4th Edition with Modern Physics, Raymond A. Serway and John W. Jewett, Jr. Thomson/Brookscole (2006)

Grading: Grades for this course will be based on homework assignments, tests, quizzes, in-class assignments and student participation.

Homework	15%
Exam 1	10%
Exam 2	10%
Quizzes	8 %
In-class work, participation	10%
Final Exam	20%
MCSP Lecture Series	2%
Lab	25%

Points	Grade	Points	Grade
<60	F	76-79	C+
60-62	D-	80-82	B-
63-65	D	83-85	B
66-69	D+	86-89	B+
70-72	C-	90-94	A-
73-75	C	≥95	A

Expectation: Students are expected to put in a minimum of 12 hours/ week work outside the class in order to successfully complete this course.

Academic Integrity: Policies of Academic integrity are enforced in all aspects of this course. It is the responsibility of the student to strictly adhere to the policies of Academic Integrity of Roanoke College.

Homework: There will be atleast one homework set each week, consisting of problems from the lectures given during the week. The homework sets will be posted online and must be submitted before the indicated due date/ deadline. Late homework will not be accepted.

Quizzes: These will be about 10 minutes long and will be held during the lecture time. The quiz date will be announced during one lecture period prior to the quiz date. They will consist of 5-10 questions from the homework and lecture material. There will be no make-up quizzes – if you are absent, you get zero.

In-Class Problems and Participation: You will also be required to complete problems assigned in class. Participation in class discussions is also an important aspect of learning the material.

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MCSP Colloquium Series: You are required to attend at least 2 of the several talks as a part of the MCSP colloquia this semester. You have to write up a paper on your reflections of the talk to get full credit (2 points). The reflection papers are due within one week of the talk.

Midterm Tests: There will be two tests during the semester. Exam 1 is in class and; Exam 2 is part inclass, part take home. Each test will cover the material listed on the syllabus or as informed by me in class, prior to the tests.

Final Exam: Yes, there will be a final exam at the end, and it is cumulative! It is an inclass exam.

Labs: Labs are worth 25% of the grade and will be instructed by Dr. Fleenor. Students cannot pass this course without successfully completing all the requirements of Phys 203L

Attendance: Students are required to attend every class. Your attendance will be recorded each lecture period. If you show up 10 minutes late, you will be marked absent. Any student who has four consecutive absences will be dropped from the course. A warning e-mail/letter will be sent when the third consecutive absence occurs. Also any student who misses a total of five classes will be dropped from the class. This includes both excused and unexcused absences. A warning letter/email will be sent when the fourth absence occurs. Any unexpected absence due to health reasons/emergency situation/participation in a conference or sporting events representing the College should be supported by proper documentation such as doctor's note, court order, and schedule of conference/sports events. You will need to inform me prior to the absence or within 48 hours of such an absence to be considered as excused. It is best to inform me about your absence in person. Emails and phone voice messages are not very reliable. It is your responsibility to make up for the work that you missed. I will not extend the deadline for turning in homework or other work assigned in the class unless you have my prior approval.

Class Disruption: All students are entitled to a professional learning environment. Students should not act in a manner which will distract and disrupt the class learning experience. Such practices will not be tolerated. Cell-phones, pagers, beepers or any other electronic communication/entertainment devices must be turned off at all times during the lecture period

Academic Integrity: Policies of Academic Integrity of Roanoke College are enforced in all aspects of this course. It is the responsibility of the student to strictly adhere to the policies of Academic Integrity of Roanoke College.

Philosophy: My teaching philosophy is not to make you memorize equations but rather help you understand the basics Physics. I am willing to work with you, if you need extra help. Please talk to me if you have any problems understanding the material. ASK QUESTIONS; GET YOUR DOUBTS CLEARED WITHOUT PROCRASTINATION. Feel free to stop by my office. I believe that questions and clarifications are best addressed in person rather than via emails and phone. I would urge you to take full advantage of my office hours to get your questions answered.

HOME WORK ACCESS: WEB ASSIGN

Homework problems will be assigned and marked using the WebAssign system. This is a basic description of how to use it:

Log-on

Go to: <http://www.webassign.net/student.html>

Your username is your RC Login id. Your institution is “Roanoke”. There is no initial password when you login, but you will be prompted to enter a password.

{If you’ve already used WebAssign your password will be the same as before}

You should see your name, school, course, etc. There is also a user’s guide to look at if you so desire.

Shoot for the first assignment “Test Assignment”. This is the easy, non-physics one!

One fundamental concept is registering. Without this you will soon (in one week) be unable to log-in. This means you can’t do your homework. This means you get zero. This is not good!

Registering

You have a one week grace period during which you can use WebAssign without registering. After this, if you have not registered, you will not have access to your assignments. This would be bad.

There are two ways to register – you can purchase a WebAssign Access card from College online bookstore (they should be available!) and “Enter Access Code”; or you can register directly online using the “Credit Card Registration.

YOU MUST REGISTER BY 11:59 pm on Jan 20th 2017!

Week	Date	Chapter	Topic	Reading Sections
1	16-Jan		Introduction	
	18-Jan	Ch 1	Classical Physics, Waves Particles	1.1, 1.3
	20-Jan		Forces, Atoms, Questions	1.4-1.6
2	23-Jan	Ch 2	Early Relativity, Einstein's view	2.1-2.3
	25-Jan		Lorentz Transformation	2.4
	27-Jan		Time Dilation , Length Contraction	2.5
3	30-Jan		Relativity, Twin Paradox	2.7 -2.9
	1-Feb		Mass Energy Equivalence	2.11-2.12
	3-Feb		Applications	
4	6-Feb	Ch 3	X-rays, Electrons, Spectra	3.1-3.4
	8-Feb		Black Body Radiation	3.5
	10-Feb		Photo Electric Effect	3.6
5	13-Feb		Compton Effect	3.8
	15-Feb		Applications	
	17-Feb	Ch 4	Atomic Model	4.1, 4.3
6	20-Feb		Bohr Model	4.4
	22-Feb		Applications	
	24-Feb		Exam 1 (Ch 1,2,3,4)	
7	27-Feb	Ch 5	DeBroglie Hypothesis	5.1-5.3
	1-Mar		Uncertainty Relation	5.4-5.6
	3-Mar		Wave Function, Probaility Waves	5.7-5.8
8	6-Mar	Spring Break		
	8-Mar			
	10-Mar			
9	13-Mar	Ch 6	TISE	6.1
	15-Mar		Expectation Values	6.2
	17-Mar		Infinite Potential Box	6.3
10	20-Mar		3D Infinite Potential	6.5
	22-Mar		Finite Potential Box	6.4
	24-Mar		Barriers and Tunneling	6.7
11	27-Mar		Applications	
	29-Mar	Ch 7	Hydrogen Atom Wave functions	7.1-7.2
	31-Mar		Wave function Solutions	7.3
12	3-Apr		Quantum Numbers , Spin	7.3, 7.5-7.6
	5-Apr	Ch 8	Periodic Table	8.1
	7-Apr		Exam 2 (Take Home) Ch 5, 6, 7	
13	10-Apr	Ch 12	The Nucleus, Stability	12.1-12.5
	12-Apr		Radioactive Decay	12.6,12.7
	14-Apr	Good Friday No Classes		
14	17-Apr	Ch 14	Particle Physics	14.1-14.3
	19-Apr		Conservation and Families	14.4-14.6
	21-Apr		Accelerators, Applications	14.8
15	24-Apr		Review	
16	1-May		Final Exam (2-5 pm)	