

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

RoomNo:243,Trexler/Massengill

Phone: 540-375-2057; E-mail: bala@roanoke.edu

Office Hours: MW: 2.20-3.20pm; TTh: 1.10-2.10 pm; Additional Hours: By Appointment

Meeting Time: Block 1 MWF: 8:30-9:30 am

Required Textbook: Physics for Scientists and Engineers (8th Edition)

Overview: This is a capstone course that captures the essence of what a Physics major is expected to know.

The following is taken from the Roanoke College mission statement for students majoring in physics: *“Students majoring in physics are provided with a curriculum that emphasizes a balance of breadth and depth of knowledge of the field. Physics students learn to address real-world problems through a curriculum that provides a balance between sound theoretical frameworks and practical expertise. Graduates are well prepared for traditional and non-traditional career paths and are capable of contributing broadly to the global scientific community”*

Some of the objectives of this course are 1) To be conversant of the fundamental laws of Physics and be able to apply them in solving problems 2) To be able to design and demonstrate the understanding of the laws of Physics through innovative experimentation 3) To be able to see the relevance of physics to technology and its applications and apply the knowledge in future career.

The course is divided into three sections, namely

- 1) Review of fundamental Physics
- 2) Design and build demo experiments that elucidate fundamental laws of Physics
- 3) Understand and analyze the significance of laws of physics in modern day applications.

Grading:

- 1) Review Material (Team work and Individual)
 - Presentation and Discussion (Team) 10%
 - Quiz (Individual) 15%
 - Oral Exam (Individual) 15%
- 2) Demonstration Project (Team Work)
 - Project Documentation and User Manual 5%
 - Demo and Presentation 20%
 - Peer Evaluation 5%
- 3) Capstone Application (Individual)
 - Quiz 5%
 - Topic Paper 10%
 - Project Presentation 15%

Team Roles: The class will be divided into four teams. On each team activity, your team should designate a coordinator to organize work sessions, make sure everyone knows where and when to meet and to check the research and the strategies used to prepare the discussion document, a recorder to prepare and turn in papers/presentations. The team roles must rotate on every activity – once a team member has carried a role, he/she may not do it again until everyone else on the team has done it. If a team is unhappy with the performance of a non-participative member, he/she can be fired from the team. Individuals who are fired must find a team (either a new team or form their own team with at least one more member) unanimously willing to accept them; otherwise they will lose 40% of the points for the team activities. Please be aware that I will not get involved in team member conflicts. You will need to work out the differences on your own.

Individual effort and assessments for team work: All students will periodically be asked to submit evaluations of how well they and their teammates performed as a team. These evaluations will be incorporated into the activity grade.

Colloquium Series: You are required to attend at least 3 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. The papers will be graded on a scale of 1-3. A well written and reflective paper will be awarded 3 points. Points from MCSP reflection will be added to the total at the end. This will help swing your grade between a +/-

Quiz: The quizzes will be based on the review material from PSE textbook as well as assigned reading material from capstone topic.

Exams: There will be one departmental oral exam indicated in your syllabus.

Presentation: You will be required to give several presentations as a part of the course. More information will be provided in class at appropriate times during the semester

Topic Paper: You will be turning in a 5-7 page long paper on a specific topic of interest to you that you will independently research on. Details of this will be made available to you before spring break.

Inquire: Log-in to Inquire program via MyRC web portal on the College website. This will give you access to the syllabus, office hours schedules, lecture notes, any class announcements and a bunch of other stuff. Regular updates will be available posted here. Make sure to check the Inquire website regularly!!! No excuses can be made and no extensions can be granted if you miss a deadline that was posted on Inquire.

Attendance: Students are required to attend every class. Any student who a total 5 meetings (includes class and team meetings) will be dropped from the course with a grade of DF. This includes both excused and unexcused absences. A warning e-mail/letter will be sent when the fourth absence occurs. Excused Absence: 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 the 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, or any other electronic communication/entertainment devices must be turned off at all times during the lecture period.

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.

Disclaimer: Everything above is subject to change with notice and, where appropriate, with your approval.

Week	Date	Chapter	Topic		
1	14-Jan		Introduction		
	16-Jan		Research AIP Webpage on careers in physics and engineering		
	18-Jan		Create 1 page resume and/or a professional CV - Career Services		
2	21-Jan		Overview		
	23-Jan		Review POP-SE Ch 1-4		
	25-Jan		Breakfast with Dava Newman		
3	28-Jan		Review POP-SE Ch 5-8		
	30-Jan		Review POP-SE Ch 9-12		
	1-Feb		Review POP-SE Ch 13-16		
4	4-Feb		Review POP-SE Ch 17-20		
	6-Feb		Review POP-SE Ch 21-24		
	8-Feb		Review POP-SE Ch 25-28		
5	11-Feb		Review POP-SE Ch 29-32		
	13-Feb		Review POP-SE Optics		
	15-Feb		Review Modern Physics - Atom Models, Wave Particle Duality, HUP		
6	18-Feb		Review Modern Physics -TISE, Particle in a box		
	20-Feb		Preparation for Oral Exam		
	22-Feb		Oral Exam/ Advanced Topic Research		
7	25-Feb		Oral Exam/ Advanced Topic Research		
	27-Feb		Oral Exam/ Advanced Topic Research		
	1-Mar		Oral Exam/ Advanced Topic Research		
8	4-Mar	Spring Break			
	6-Mar				
	8-Mar				
9	11-Mar	Advanced Topic Research			
	13-Mar				
	15-Mar				
10	18-Mar			Advanced Topic Research	
	20-Mar				
	22-Mar				
11	25-Mar	Advance Topic Presentations			
	27-Mar				
	29-Mar				
12	1-Apr	Demo Project			
	3-Apr				
	5-Apr				
13	8-Apr			Demo Project	
	10-Apr				
	12-Apr				
14	15-Apr	Demo Project			
	17-Apr				
	19-Apr				
15	22-Apr				Demo Project Presentation
16	29-Apr				Topic Paper Due