

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

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Office Hours: MWF: 10-11 am; Th 1.15-2.15pm; Other Hours: By Appointment

Course Overview:

The focus of this scientific reasoning course is to understand the way things work in our natural world. To that effect, fundamental questions such as why study motion, what factors contribute to the motion of an object and how do these contributing factors produce the observed motion of a sky diver and a deep sea diver? The basics laws of physics applicable to sky diving and deep sea diving will be understood through a suite of laboratory experiments that are exploratory in nature. In this course, the focus will be on the process of science as it is motivated through measurements and inquiry.

While we will cover traditional topics of an introductory physics course, the format of the course will be quite different than the traditional approach. Very little formal lecturing will take place. Instead, we will attempt to have a very hands-on class where students will do experiments.

Cooperative learning groups, computer-assisted activities, worksheets, etc, will facilitate the conceptual understanding process. The emphasis here is on understanding not memorizing. Physics is essentially an experimental science, not a collection of tenets to be handed down. In this class the focus will be on the process of science as it is motivated through measurements and inquiry. To that end, it is important to keep up with the material, to do the homework, and attend and participate in every class.

Learning Objectives:

In order to achieve proficiency in scientific reasoning and to explain the way things work in sky diving and deep sea diving, upon completion of this course, successful students will be able to

- understand how a scientific theory relating forces and motion can be developed from systematic observations and experiments
- observe, classify and describe physical processes using different representations including words, pictures, graphs and mathematical equations
- design experiments to test the validity of those hypotheses in the laboratory
- develop quantitative skills through data analysis, graphical representations and interpretation
- describe the challenges in experimental methodologies to collect unbiased data, graphing techniques
- communicate their scientific findings through lab reports, project reports, reflection letters, oral presentations and class discussions

Required Text: David P. Jackson, Priscilla W. Laws, and Scott V. Franklin, *Explorations in Physics*, John Wiley & Sons, Inc., 2003

Other Course Materials: Webassign Access card for homework; one three ring binder for all your notes and homework solutions; one lab notebook: A bound lab notebook (sewn pages, not spiral bound) with graph paper pages is needed, as well as a scientific calculator.

Expectation: Students are required to spend at least a minimum of 12hrs outside the class in order to successfully complete this course.

Lab Notebook: Each student is to purchase and bring a bound notebook with graph paper pages to lab each week. A Table of Contents will be created on the first two pages of the notebook. The third page will begin the lab activities, and each new lab will begin on the right hand page with the **lab title, date of the experiment, and page number.** You should record all answers to questions, any recording of the data,

written *neatly* in table format, results in table format, all sample calculations for the results and error analysis in your lab notebook. Units should be included in all column headers and with all results. Graphs printed while in lab should be pasted in appropriate sections, printed so that they fit on the page when pasted into the lab notebook without extending past the edge of the page.

Each student will have their notebook checked before leaving lab and will be graded as follows:

10 points	Your notebook entries are organized and thorough. Date at the top of the beginning page for each lab with a title of core concepts. All data were recorded into lab notebook using the acceptable format, with graphs correctly pasted. Units are included where appropriate. Graph axes are labeled.
5 points	No date at the top; Missing activity title. Your notebook entries are haphazard, illegible, do not include units, <i>or</i> you were tardy, not prepared for class, or left early. Data / graphs were presented in a haphazard manner, too many scratches and unclear work.
0 points	Student did not bring lab notebook, did not record data/results into notebook, or did not submit notebook before leaving lab.

Due to the time limitations during lab, the notebook check will be brief and each week a different part of the lab information will be checked. At the beginning of the last week of classes, each student will submit their lab notebook and one lab will be thoroughly graded.

Grading: Grades for this course will be based on homework assignments, quizzes, exams, projects, lab-work and student participation. Final grades will be determined at the end of the semester, on absolute point scale of 100 points. The weighted % point for each assessment type is listed in the table above. For example, a student must have total points of 95 or above to receive an A grade.

Homework	14%
Quiz	5%
Exam 1	10%
Exam 2	10 %
Project 1	10%
Project 2	10%
Lab Work	20%
MCSP Colloquium	1%
Final Exam	20%

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

Homework: There will be one homework set each week, consisting of problems from the lectures given during the week. The homework assignments will be available on Webassign every Thursday at 12 am. (See attachment for instructions on Webassign). The homework will be open for one week, and will automatically close by the following Thursday at 5 pm. You will have 5 chances to submit your answers on the Webassign system. You must work on the homework problems on your own, and keep a copy of the homework with all your work in your course binder. Copying homework solutions from others or other resource materials is not allowed. Copying solutions is a violation of the Academic Integrity policy. I will drop one low homework grade at the end of the semester.

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 for the quizzes – if you are absent, you get zero. I will drop one low quiz grade at the end of the semester

Exams: There will be two mid-term exams and one final exam. The final exam is cumulative. Please refer to the course schedule for the exam dates.

Projects: There are two in-class team projects to be completed at the end of Unit A and Unit D of the syllabus. Details of the projects and the requirements will be available separately at a later time.

MCSP Colloquium Series: You are required to attend at least 1 of the several talks as a part of the MCSP colloquia this semester. You should submit a 1 page reflection paper, using Turnitin link, within 48 hours of the talk to get credit. If you miss submitting your paper within 48 hours, you will not get any credit for that MCSP talk. Simply regurgitating the talk will get you only ½ the credit. You should make connections to courses in the MCSP curriculum, as much as possible. For example if you attend a talk on statistics theme, you should make connections to the statistical concepts you have learnt. A schedule of this semester's talk can be found here.

http://roanoke.edu/Academics/Academic_Departments/Math_CS_and_Physics/Conversation_Series/Fall_2015.htm. If you attend a talk and not submit a paper, you will not get any credit.

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 with a grade of DF. A warning e-mail/letter will be sent when the third consecutive absence occurs. Also, any student who misses a total of five classes during the semester will be dropped from the class with a grade of DF. This includes both excused and unexcused absences. A warning letter/email will be sent when the fourth absence occurs.

Absences will also include the following:

If a student shows up for class 10 minutes late/walk out in the middle of the class/caught napping/texting/checking emails, he/she will be marked absent. Students who sleep in class or do not participate in lab work or engage in activities not related to this course will be marked absent. In addition, I will consider texting/checking emails/ unauthorized browsing of internet all as a form of violation of professional academic code. I will count it as AI violation and will report as one. A physical presence alone does not construe as being present in the class. Physical AND mental presence is required to be considered to be present in class.

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 homework or other work assigned in the class unless you have my prior approval.

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.

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 must be in silent mode and laptop computers or any other electronic communication/entertainment devices must be switched off at all times during the class period. ***If you are caught texting or browsing, I will consider it as an academic violation and will report it as one.***

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. If you are unsure of AI policies, please come and see me.

Additional Learning and Academic Resources:

The Office of Disability Support Services, located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library, provides reasonable accommodations to students with identified disabilities. Reasonable accommodations are provided based on the diagnosed disability and the recommendations of the professional evaluator. In order to be considered for disability services, students must identify themselves to the Office of Disability Support Services. Students are required to provide specific current

documentation of their disabilities. Please contact Richard Robers, M.A. Ed., Coordinator of Disability Support Services, at 540-375-2247 or e-mail robers@roanoke.edu.

Subject Tutoring is a CRLA Nationally Certified Program located on the lower-level of Fintel library in room 005. Subject Tutoring offers individual appointments in 30-minute intervals for Lab Sciences, Modern Languages, Math & CPSC, Social Sciences, Business & Economics. Hours are Sunday - Thursday 4 p.m. - 9 p.m. For a list of tutorials or to make an appointment, go to www.roanoke.edu/tutoring.

The Writing Center @ Roanoke College, located in Room 15 on the Lower Level of Fintel Library, offers writing tutorials for students working on writing assignments/projects in any field. Writers at all levels of competence may visit the Writing Center at any point in their process, from brainstorming to drafting to editing, and talk with trained peer writing tutors in informal, one-on-one sessions. Simply stop in, or schedule an appointment by going to www.roanoke.edu/writingcenter, where our schedule of writing workshops and creative writing playshops is also posted. Questions? Email writingcenter@roanoke.edu or call 375-4949. You can also Like our page on Facebook!

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”. Your password is your 7-digit student ID number (without the leading zeroes).

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

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

Shoot for the first assignment “WebAssign Test-run”. 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.

To register, log on to your WebAssign account and go to the “Important Announcements” section. There are two ways to register – you can purchase a WebAssign Access card from the College bookstore (they should be available!) and “Enter Access Code”; or you can register directly online using the “Credit Card Registration.

Course Schedule:

Date	Topic
Sep 2-Sep 25	Unit A : Exploration of Fundamental Concepts for Sky Diving
Sep 28	Exam1
Sep 30- Oct 14	Projects for Sky Diving
Oct 16	Presentations of Projects for Unit A
Oct 19-Oct 23	Spring Break NO Classes
Oct 26 – Nov 13	Unit D : Exploration of Fundamental Concepts for Deep Sea Diving
Nov 16	Exam 2
Nov 18 – Dec 7	Projects for Deep sea Diving
Dec 9	Presentations of Projects for Unit D
Dec 11	Review
Dec 16 (2-5 pm)	Final exam (Cumulative)