

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

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Office Hours: MW: 2.30-3.30pm; Th 1.10-2.10 pm; Other Hours: By Appointment

Course Overview: This course is a calculus based, rigorous introduction to topics in wave propagation, electricity and magnetism. Conceptual understanding and application of fundamental concepts will be emphasized throughout the course.

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

- understand the fundamental principles of physics in waves, electricity and magnetism through lectures, homework, quizzes, lab work and exams.
- develop a scientific approach to solving physics problems by using necessary calculus methods to examine the oscillating, electric and magnetic systems.
- understand the nature of propagation of mechanical disturbances and superposition principle
- appreciate the universal applicability of boundary conditions and linear wave equation
- compare and contrast the behaviour of electric and magnetic fields
- understand the principles of simple circuits and current flow
- examine the behaviour of electromagnetic systems by applying fundamental theories in electricity and magnetism

Required Text: Physics for Scientists and Engineers, Serway and Jewett, 8th Edition (Brooks Cole)

Other Course Materials: Webassign access card; one three ring binder for all your lecture notes and homework solutions

Philosophy: My teaching philosophy is not to make you memorize equations but rather help you understand the basics Physics. You must move away from rote memorization and regurgitation to pass this course. I am willing to work with you, if you need extra help. Please talk to me if you have any problems understanding the materials presented. **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 urge you to take full advantage of my office hours to get your questions answered.

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

| | |
|----------------------------|------|
| Homework | 20% |
| 3 Midterm Tests (10% each) | 30% |
| Weekly Quizzes | 5% |
| In-class work | 5% |
| Lab | 20% |
| Final Exam | 20% |
| Total | 100% |

| 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 |

Explanation of the grading scale: The 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.

Expectation: Students are expected to work for at least 8-12 hours/week outside of class to complete homework and other assigned work in this course

Homework: This is an important component of your learning and accounts for 20% of your grade! Your homework grade is worth as much as your final exam. **It is a BIG DEAL.** 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 web assign every Friday 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 11.59 pm. You will have 5 chances to submit your answers on the webassign system. At 11.59 pm, the homework system will automatically close, at which point answer key will become available. I cannot extend the deadline after the answer key is out. So, it is your responsibility to enter all your answers well before the deadline. Last minute computer crashes, network issues, software troubles are not valid excuses to ask for an extension. All such issues, if any, should be brought to my attention on or before (5pm) on Wednesday of the week when the homework is due. If you notify me of issues on Thursday, I will not have time to troubleshoot and you may miss out on your submissions. You must work on the homework problems on your own, and keep a copy of the homework with all your work in your Phys 202 course binder. Copying homework solutions from others or other resource materials is not allowed. Copying solutions is a violation of the Academic Integrity policy and there will be severe penalty for AI violation.

Quizzes: These will be about 10 minutes long and will be held during the lecture time. The quiz date will be announced one lecture period prior to the quiz date. They will consist of 3-5 questions from the homework and lecture material. There will be no make-up for the quizzes – if you are absent, you get zero.

In-Class Problems: You will also be required to complete problems assigned in class. I will drop one low in-class assignment grade at the end of the semester.

MCSP Colloquium Series: You are required to attend at least 2 of the several talks as a part of the MCSP colloquia this fall. You should submit a 1 page reflection paper, using turn it in link, within 48 hours of the talk to get credit. Simply regurgitating the talk will get you only ½ the credit. For example if you attend a talk on statistics theme, you should make connections to the statistical concepts you have learnt. MCSP credits, a maximum of 2 extra points, will be added to your course total at the end. This can swing the needle between a + /-. Do not wait till the end of the semester to attend one of these talks, as you may run out of options. You should make connections to courses in the MCSP curriculum, as much as possible. A schedule of this semester's talk can be found on MCSP webpage.

Midterm Tests: There will be three tests during the semester. These will be held during the class time listed on the syllabus. Each test will cover the material listed on the syllabus or as informed in the class, prior to the tests.

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

Labs: Will be conducted every Thursday from 2.50-5.50 pm and will be instructed by Dr. Dan Robb. The lab instructions and the syllabus will be provided during the first day of lab session, on Sep 7th. Lab work will count for 20% of your overall grade. You cannot pass this course without successfully completing all required work, as laid out in the lab syllabus.

Attendance: Students are required to attend every class. Attendance will be recorded during every class meeting. Any student who misses a total of four classes will be dropped from the course with a grade of DF. This includes both excused and unexcused absences. A warning email will be sent after the third absence occurs. This will be cc-ed to your academic advisor and registrar.

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. In addition, I will consider texting/checking emails/browsing 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.

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, gaming devices, laptop computers, tablets or any other electronic communication/entertainment devices must be turned off at all times during the lecture period. If you are caught texting or browsing, I will consider this as an academic violation and will report it as one. If you must use a tablet/laptop for taking notes, make sure you turn off the wifi or keep it in airplane mode.

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 Writing Center @ Roanoke College is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. Student writers working in any field of study at any level of competence meet with trained peer writing tutors in informal, one-on-one sessions. Writers may meet with tutors at any point in the writing process, from brainstorming to drafting to editing. Simply stop in or schedule an appointment ahead

of time by going to MyRC: Academics and looking for the Writing Center Schedule link. The Fall schedule will be posted at www.roanoke.edu/writingcenter .

Subject Tutoring, located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library, is available in various academic subjects such as Business & Economics, Foreign Languages, Lab Sciences, Math, CPSC, Statistics, and Social Sciences. All subject tutors are recommended by faculty members and receive training before working with students. Hours vary by subject, so be sure to visit our homepage for a complete list of tutorial hours: www.roanoke.edu/tutoring.

The Office of Special Services: The Office of Special Services provides reasonable accommodations to students with identified disabilities. Although Roanoke College does not have special programs for students with disabilities; reasonable accommodations are provided based on the diagnosed disability and the recommendations of the professional evaluator. In order to be considered for special services, students must identify themselves to the Office of Special Services. Students are required to provide specific current documentation of their disability. Reasonable accommodations may include but are not limited to the following: extended time for tests and examinations, testing in a semi-private testing area, proctoring of examinations, use of interpreters, assistive technology, audio recording of lectures, and/or student note-takers. For additional information please contact Pam Vickers, Special Services Coordinator, at 540-375-2247 or email vickers@roanoke.edu .

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 student ID number.

{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 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.

YOU MUST REGISTER BY 12:00am on Sep 6th 2017!!

| | | | Lecture Schedule | | |
|------|--------|--------------------------------|---|-------------------------------|--|
| Week | Date | Chapter | Topic | Lab | |
| 1 | 30-Aug | 15 | Introduction, Simple Harmonic Motion | No lab | |
| | 1-Sep | | Energy of SHO, Pendulum | | |
| 2 | 4-Sep | 16 & 17 | Travelling wave, properties | Simple Harmonic Motion | |
| | 6-Sep | | Linear wave equation | | |
| | 8-Sep | | Sound waves, Doppler effect | | |
| 3 | 11-Sep | 18 | Boundary conditions; Interference | Resonance | |
| | 13-Sep | | Superposition Principle, Standing Waves | | |
| | 15-Sep | | Air columns | | |
| 4 | 18-Sep | 23 | Electric Charge, Coulomb's Law, Motion of a charge | Electric Field | |
| | 20-Sep | | Continuous Charge Distribution | | |
| | 22-Sep | | Electric Field, Field Lines | | |
| 5 | 25-Sep | 24 | Electric Flux | Gauss's Law and Exam 1 Review | |
| | 27-Sep | | Gauss's Law and Applications | | |
| | 29-Sep | | Exam 1 | | |
| 6 | 2-Oct | 25 | Electric Potential | Electric potential | |
| | 4-Oct | | Potential due to Charge distribution | | |
| | 6-Oct | | Potential due to charge distribution contd. | | |
| 7 | 9-Oct | 26 | Capacitors, Capacitance | Capacitors | |
| | 11-Oct | | Capacitor network rules | | |
| | 13-Oct | | Applications | | |
| 8 | 16-Oct | No Classes - Fall Break | | No Lab | |
| | 18-Oct | | | | |
| | 20-Oct | | | | |
| 9 | 23-Oct | 27 | Electric current, resistance | Resistance | |
| | 25-Oct | | Temperature effects | | |
| | 27-Oct | | Power, superconductors | | |
| 10 | 30-Oct | 28 | EMF, Effective resistance | Exam 2 Review | |
| | 1-Nov | | Kirchoff's Laws, RC Circuits | | |
| | 3-Nov | | Exam 2 | | |
| 11 | 6-Nov | 29 | Magnetic Field, Force | Magnetic Field | |
| | 8-Nov | | Motion of charged particle in B field; Applications | | |
| | 10-Nov | | Magnetic Force on current carrying conductor | | |
| 12 | 13-Nov | 30 | Magnetic Torque, Applications | Biot-Savart Law | |
| | 15-Nov | | Biot-Savart Law, Amperes Law | | |
| | 17-Nov | | Gauss's Law of Magnetism | | |
| 13 | 20-Nov | | Magnetism in Matter | No lab | |
| | 22-Nov | | No Classes - Thanksgiving Break | | |
| | 24-Nov | | | | |
| 14 | 27-Nov | 31 | Induced currents and emf | Exam 3 Review | |
| | 29-Nov | | Faraday's Laws | | |
| | 1-Dec | | Exam 3 | | |
| 15 | 4-Dec | 32 | Self Induction, Inductance, RL Circuits | Makeup Lab | |
| | 6-Dec | | Energy in a magnetic Field, LC Circuits | | |
| | 8-Dec | | Applications | | |
| | 13-Dec | | Final Exam (8.30 am - 11.30 am) | | |