

DEPARTMENT OF PHYSICS AND ELECTRONICS
PHYSICS 2
2024 COURSE BROCHURE

Welcome to second-year physics at Rhodes - I am Prof. Joey Medved, the second-year course coordinator. My office is Room 41, on the second floor of the physics building. Please visit my office if you have any questions or concerns about the course. **Please read this brochure** and keep a copy on file for the rest of the year. It explains important details of the course such as

- course structure,
- which books you need,
- how the final marks are calculated,
- and when your lectures and tests are.

Physics 2 consists of two **one-semester courses**, **PHY201** and **PHY202**. These run in the first and second half of the year, and are examined in June and November, respectively.

Each course has a **Theory** and a **Practical** Component. The Theory Component in turn comprises several **modules** but the Practical Component is not divided into modules. I have deliberately emphasised the terms **course**, **component**, and **module**. To illustrate the differences between these terms,

- PHY201 and PHY202 are **courses**,
- Quantum Mechanics is a **module** and is part of the theory **component**,
- and the Theory **Component** generally comprises four theory **modules** per semester.

The normal prerequisites for Physics 2 are credits in Physics 1 and Mathematics (MAT 1C).

1. LECTURE MATERIAL

The lecture venue is the Physics Lower Lecture Theatre (LLT). A **Class Test** is written at the end of each module. The provisional test dates are listed below, as are the dates for the theory modules. The test dates may sometimes be changed after mutual agreement and with the consent of the lecturer. The dates of the theory modules may also be subject to minor changes.

Dates	No of Lec+Tuts	Module	Lecturer	Tests
Physics 201				
12 Feb to 23 Feb	12	AC Theory	A.Sullivan@ru.ac.za	23 Feb
26 Feb to 20 Mar	23	Vibrations	to be determined	20 Mar
22 Mar to 22 Apr	18	Waves	Jennifer.Williams@ru.ac.za	22 Apr
23 Apr to 15 May	19	Electrostatics	J.Medved@ru.ac.za	15 May
Physics 202				
8 Jul to 26 Jul	18	Special Relativity	Jennifer.Williams@ru.ac.za	26 Jul
29 Jul to 16 Aug	17	Quantum Mechanics	D.Roux@ru.ac.za	16 Aug
26 Aug to 13 Sep	18	Optics	Jennifer.Williams@ru.ac.za	13 Sep
16 Sep to 7 Oct	18	Classical Mechanics	D.Roux@ru.ac.za	7 Oct

2. LEARNING OUTCOMES

You should be able to solve the end-of chapter textbook problems **and** understand the underlying physics **and** be able to solve unseen problems of similar difficulty. A popular sentiment is: *“I really understand the theory. I just can’t do the problems.”* It is very important that you work on problems every day.

We will teach you a solid problem-solving methodology and good problem-solving habits, so heed our advice.

3. PRACTICAL WORK

Practicals are on Mondays. They start in the 6th period (12:20) and run through until 17:00, with the usual lunch break from 13:05 until 14:00. The 6th-period slot is often used for a pre-prac talk, given in the LLT by default. In addition, the 6th period on Tuesdays has also been reserved for you to work on unfinished practical work. This period is usually not supervised unless you request help.

In the first semester, the practicals are run in Room 26 by Dr. Kuja. In the second semester, they are held in Room 8, and run by Prof. Roux.

You will need to purchase an A4-format hardcover notebook of at least 150 pages for each semester. This will be your laboratory notebook. We insist that the books be hardcover. Normally, you will submit your book at the end of every week for assessment. This work will comprise your Practical Class Record, which counts 1/3 of the final Practical mark. The Practical Exam makes up the remaining 2/3. You will do formal experimental write-ups for some of the experiments.

4. AFTER-HOURS ACCESS

At present, after-hours access to the Physics Department is not possible.

5. CLASS RECORD

There will be hand-in assignments for each theory module. This **Continuous Assessment** normally constitutes 1/3 of your **Class Record** for the module, and the **Class Test** accounts for the remaining 2/3.

6. DP REQUIREMENTS

“DP” stands for “duly performed”. You may not write the examination unless you meet the minimum DP requirement: attendance and completion of at least 80% of the practicals and tutorials, and an average Class Record of at least 40% in the first semester and 45% in the second.

7. EXAMINATIONS

Two 3-hour Theory Exams and one 3-hour Practical Exam per semester.

8. SUBMINIMA AND AGGREGATE PASSES

As already mentioned, Physics 2 comprises two courses, PHY201 and PHY202. The prerequisite for admission to Physics 3 is an **aggregate pass** in Physics 2, and a necessary (but not sufficient) condition for an aggregate pass is that your final mark in each course exceed a threshold called a subminimum. The subminimum is 40% in PHY201 and 45% in PHY202. The pass mark is 50%.

If you fail either PHY201 or PHY202 but obtain an aggregate of at least 50% in the pair, you pass Physics 2 with two semester credits, provided that you obtain at least the subminimum in the failed course. Normally, both courses must be taken and passed during the same academic year. You then meet the requirements for admission to Physics 3.

However, if you fail one of the courses with less than the subminimum, you fail that semester and also Physics 2. You keep the semester credit for any course you pass, and may combine it with the other course, should you pass it in a subsequent year. This would earn you a **non-continuing pass** in Physics 2. You are then not normally eligible to register for Physics 3.

Note that the prerequisite to register for Physics Honours (Physics 4) is a minimum average of 60% in Physics 3.

9. TEXTBOOKS & COURSE NOTES

The required text books can be borrowed from the Department for the semester for a nominal fee (the fee enables the Department to replace battered books!). The person who deals with this is the **Office Administrator** in **Room 34**. If you are viewing physics as a career choice, it is a good idea to consider buying your own books.

Some Modules (*e.g.*, Properties of Matter) have no prescribed book. In such cases, the lecturer will direct you to texts on reserve in the University Library.

You will need to borrow the following books:

- KING, GC, *Vibrations and Waves*, John Wiley & Sons, 2009. Hire: R65.
- HOROWITZ, P and Hill, W, *The Art of Electronics*, 2nd ed., Cambridge University Press, 1991. Hire: R50.
- MOORE, TA, *A Traveler's Guide to Spacetime*, McGraw-Hill, 1995. This is only required for Physics 202. Hire: R40.
- PHILLIPS, AC, *Introduction to Quantum Mechanics* Wiley & Sons, 2003. This is required for Physics 202. Hire: R100.
- WANGSNESS, RK, *Electromagnetic Fields*, John Wiley & Sons, 1986. This is required for Physics 202. Hire: R50.

You will be given course notes for some of the Modules. In order to cover the cost of printed notes which you will receive during the year, your University account will be debited with the amount of R140 per semester.

10. MATHS/APPLIED MATHS 2

You are strongly encouraged to take Mathematics/Applied Mathematics 2 concurrently with Physics 2 and include the Modules in Advanced Calculus, Linear Algebra and Differential Equations. Please make a special effort to pass Mathematics 2 and Physics 2 in the same year, since it is impossible to repeat Mathematics 2 while also doing Physics 3 because of timetable clashes.

11. WEB PAGE

Further information about the Department and courses offered may be found at <http://phlinux.ru.ac.za/physics/> or, alternatively, by following links at the University home page, <http://www.ru.ac.za>.

12. PHYSICS 2 TIMETABLE

	DAY	PERIOD	TIME
Lectures	Monday	5	11.25 to 12.10
	Tuesday	1	7.45 to 8.30
	Wednesday	2	8.40 to 9.25
	Thursday	3	9.35 to 10.20
	Friday	4	10.30 to 11.15
Tutorial	Wednesday	6	12.20 to 13.05
Practicals	Monday	6-10	12.20 to 17.00
	Tuesday	6	12.20 to 13.05

13. BREAKDOWN OF FINAL RESULT

For each semester course (PHY201 and PHY202), the contribution of any theory module to the overall mark is proportional to the number of lecture slots in that module. For example, if there are 100 lecture slots during the semester, and 23 of these are allocated to Module X, then X will account for 23% of the Theory Course Mark.

There are two Theory Exam papers and one Practical Exam. Your final **course mark** is calculated as per the table below. Note that **the Class Record contributes one third of the marks** in the final result. Read that last sentence again. Now read it one more time. If you need to remind yourself how the Class Record is constructed, review Section 5.

The Class Record for your Practical Course comprises the marks of all the weekly practicals (laboratory experiments).

PHY201 or PHY202	Marks	% of final result
Theory Exam P1	200	~ 22%
Theory Exam P2	200	~ 22%
Practical Exam	200	~ 12%
Theory Class Record	200	~ 22%
Practical Class Record	100	~ 11%
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	900	100%
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14. LAST WORD

Remember that physics is not about memorizing long lists of unfriendly formulas. It is really about understanding concepts, which are often counter-intuitive. That is what makes it so interesting and, at the same time, so challenging. The structure of physics is hierarchical and cumulative, and so your understanding has to be built up incrementally, in small steps over a long time. Cramming is not an option! Physics competence comes with practice, so it is vital that you work as many end-of-chapter problems as you can. The learning is in the doing.

There is a strong correlation between Class Record and exam results, and this is the rationale for the DP requirement. Our records show that nobody with a Class Record of less than 40% has ever passed the exams. So that, if you fail to get DP approval, you cannot write the exams. This will let you focus on passing your other subjects, and we will welcome you back next year.

It is best if you structure your days with a regular physics study routine. Make the sessions be short and manageable. One hour six times per week is better than six hours once a week, and 12 hours every fortnight is a hopeless waste of time. Physics is a strange combination of discipline, frustration and fun. I hope you will enjoy it!