



## **PHYS 152 General Physics: Electricity & Magnetism – Calculus-Based**

**(4 credits)**

This course introduces students to calculus-based physics with a strong emphasis on problem solving and modelling. In more detail, main topics will include:

- ✓ Coulomb's law
- ✓ Ohm's law
- ✓ Current and power
- ✓ RC circuits
- ✓ Kirchhoff's junction rule and Kirchhoff's mesh rule
- ✓ Electric field and electric flux
- ✓ Gauss's law
- ✓ Electrostatic potential
- ✓ Capacitance and dielectrics
- ✓ Magnetic fields
- ✓ Ampere's law
- ✓ Faraday's law
- ✓ Inductance, RL and LC circuits
- ✓ Maxwell's equations
- ✓ Introduction to RLC circuits, light, refraction, reflection
- ✓ Snell's law and optical instruments (lens, microscopes)

At the end of this course students should be able to meet these outcomes:

- ✓ Solve problems using Gauss's law, Ampere's law, Faraday's law, Snell's law and Maxwell's equations in a calculus-based manner and using critical thinking;
- ✓ Build and model electric circuits (RC, RL, LC, RLC), calculate currents and voltages.

**Prerequisite:** Physics I

### **Course Materials**

- ✓ Raymond A. Serway & Jerry S. Faughn, *College Physics*, 4th Edition, Saunders College Publishing, 1991, ISBN: 978-0030035623;
- ✓ Walker, Halliday, and Resnick, *Fundamentals of Physics*, 12<sup>th</sup> Edition, Wiley & Sons, 2021, ISBN: 978-1119773511.

## Course Organization

This course contains 30 lessons structured around 2 mid-course exams + the final one.

### Labs

The course includes **4** labs. Labs are all “hands-on” and placed throughout the instructional year. Students will spend at least 12 hours (3 hours per lab) in laboratory investigations. First three labs will be mainly faculty-directed, meaning that the students are given instruction on the operation of lab equipment and guidance in the process of the experiment. Each lab will be theoretical (questions that need to be answered in the lab report), practical (ex. building the circuit) and computational (analytical and numerical calculus). The final lab is student-directed: the students are given an objective, and standard materials needed to conduct a lab, and is thought as a summary (in terms of concepts) of previous labs. At the end of each lab, a report must be produced.

### Exams

Students will complete 2 mid-course exams and a comprehensive final exam in the last week.

#### A) Mid-course Exams

The 2 mid-course exams (each covering three-weeks topics) contain 2 problems with a different number of questions (max. 10 points per problem). The maximum score for each mid-course exam is **20**.

#### B) Final Exam

The final exam is comprised of 3 problems: 2 of them (max. 10 points per problem) covering the first 7 weeks and 1 (maximum 5 points) covering the topics of the final two weeks. The maximum score for the final exam is **25**.

### Grading

Your grade in this course will be based on these tasks and exams.

- ✓ 2 Mid-course Exams: 20%
- ✓ 3 Lab reports: 20%
- ✓ Final Lab report: 20%
- ✓ Final exam: 25%
- ✓ Attendance and participation: 15%

## **Grading Scale**

A	95%-100
A-	90%-94%
B+	87%-89%
B	83%-86%
B-	80%-82%
C+	77%-79%
C	73%-76%
C-	70%-72%
D+	67%-69%
D	63%-66%
D-	60%-62%
F	under 60

## **Sant'Anna Institute procedures**

### **Classroom Behavior**

All students are expected to observe basic tenets of common decency and acceptable behavior. This means turning off cell phones, pagers, iPods, and other devices, and putting away newspapers and other forms of distraction, for the duration of the class period (exceptions will be allowed for emergencies with advance permission of the professor). Please come to class on time and plan to stay for the entire period. Coming late and/or disrupting the learning environment shows disrespect for the faculty and your colleagues.

### **Late Assignments**

Late assignments may be accepted only with the advance approval of the professor and will be assessed a late penalty of one letter grade per day late. If you have a problem with a due date because of a specific emergency, please notify the professor in advance or plan to turn the assignment in early. To pass this class, all assignments must be completed. Any missing assignments at the end of the course will result in an overall course grade of D or F.

### **Contesting a grade**

If students wish to contest a grade, they must make an appointment to do so in person. The student should contact the instructor with any concerns within 3 days of receiving the grade. The student must also demonstrate that they have read the comments accompanying the grade by presenting a brief written statement specifying why the grade does not reflect the quality of the work. It is at the discretion of the instructor to decide whether the work and the student's request warrant any increase or decrease in the grade. Students should retain a copy of all submitted assignments and feedback (in case of loss) and should also retain all of their marked assignments.

## **Academic Honesty Statement**

Academic dishonesty is NOT tolerated in this course. Academic honesty is not only an ethical issue but also the foundation of scholarship. Cheating and plagiarism are therefore

serious breaches of academic integrity. If you refer to someone else's work, appropriate references and citations must be provided.

**Attendance:**

Students are allowed 1 unexcused absence. Documentation for any other absence MUST be produced and APPROVED by the professor or the Academic Director. For absences due to illness, they are invited to provide the professor with doctor's note upon returning to class as well as inform them and /or the school the first day of illness. Each unexcused absence after the first will reduce the grade by 3 percentage points.