

## About this Book

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This text does not replace the calculus courses you take in the mathematics department. In fact, all calculus courses are either a pre- or a co-requisite for this course. Why, then, do student often require Math Methods in Chemistry in their formal chemistry curriculum?

Most students perceive advanced physical chemistry courses, as the most challenging classes they have to take as chemistry majors. Physical chemistry professors will tell you that often, the main problem is that students do not have the mathematical background needed to succeed in the course. How is this possible after all the math you took in your freshman and sophomore years? Even when the mathematics department does a great job at teaching their courses, most chemistry majors have a hard time understanding how to apply the concepts they learned to the problems in chemistry where these concepts are needed. Even students that got all As in their calculus courses freeze when having to use the properties of partial derivatives to derive an equation and they do not remember how to perform a triple integral when required to do so in physical chemistry. At the end of the day, physical chemistry professors end up spending a lot of their time reviewing material they think students should know, and cannot advance with the new material at the level they believe a chemistry major should be at.

This situation is universal, and in fact physical chemistry professors all around the world share the same experiences. The author's chemistry department decided to try an experiment that ended up being a required course in your curriculum. Our philosophy is that if we talk about math directly in the context of chemistry, students will acquire the confidence they need to use math any time they need it. Some of the concepts we will cover in this text are just a refresher of concepts you already saw in your calculus courses. Still, seeing them applied to chemistry will help you understand them deeper than you did when taking calculus. In addition, some students tend to shut down when they feel they are learning something that does not apply to their major, and this (unfortunately!) happens with math all the time. Hopefully, seeing things again in context will motivate you to re-learn the concepts you thought were useless for you. Of course, not everything will be a review. We will learn about linear algebra, differential equations, operators, and other mathematical tools that will be new for most of you. Our goal is that you become comfortable using these tools, and understand why they are important in chemistry. This will be at the cost of not being comprehensive as a mathematics class might be, but this is the penalty we will have to pay for having to survey so much material in one semester. In any case, our hope is that once you feel more confident in your ability to do math, you will be able to continue learning on your own or in other courses as your career takes you through different paths.