This document gives you an overview of what we are going to study calculus 2. The basics for the structure of the course are included in the Getting Started In Calculus 2 document. This document gives more detail about the material itself.

We will cover 4 chapters in this course, 7-10. Calculus 2 is the usually considered the most difficult of the first 4 calculus courses (calculus 1-3 and differential equations). In calculus 1, there was a common theme running through the course, called derivatives. This is not the case in calculus 2 (and calculus 3 for that matter). Calculus 2 is a mixture of all different uses of limits, derivatives and integrals. Consequently, it is hard to get a rhythm going in the course. One chapter may be really easy while the next one is very difficult.

**CHAPTER 7 --- APPLICATIONS OF INTEGRATION**

Chapter 7 can be thought of as containing two different types of problems. Sections 7.1 – 7.4 are problems involving integrals to find area, volume and arc length. You will need to do some graphing, so get your graphing utility set up early.

Take some extra time to focus on these sections, especially area and volume. The textbook is pretty good with these subjects but I have added some information in the worksheets that should help you. The reason you need to really understand area and volume is that in calculus 3, chapter 14 in this textbook, you will be calculating areas and volumes again but using different techniques. If you get it in this chapter, chapter 14 will be much easier.

The second half of the chapter, sections 7.5 – 7.7, contains physics applications of integration. The integrals in these sections are not hard, setting them up is the trick.

**CHAPTER 8 --- INTEGRATION TECHNIQUES, ETC.**

Chapter 8 is mixture of different integration and differentiation applications. Section 8.1 is a review of integration techniques, not much new here. Section 8.2, Integration by Parts, is critical for your understanding. Make sure you get this section because you will need to use those techniques all the way through calculus 3 and into differential equations.

Section 8.3 and 8.4 involve trig integration in two different ways. Section 8.3 has trig integrals that you learn techniques on how to integrate. Section 8.4 is a very interesting section where you are given an integral in one of several specific forms and you introduce trig into the integral in order to be able to integrate. I think you probably know by now that integration is trickier than differentiation. This section gives another way cool technique to handle integrals.

Section 8.5 shows you how to integrate a rational expression using partial fractions. It’s pretty straightforward. Some miscellaneous integration techniques are given in section 8.6, including using integration tables.

Sections 8.7 and 8.8 are very interesting sections that show you how to evaluate limits using L’Hopital’s Rule (8.7), a very easy technique, and how to evaluate improper integrals (8.8). In section 8.8 especially, read carefully under what conditions you can use integration and watch your notation. This is one section where notation is especially important.

**CHAPTER 9 --- INFINITE SERIES**

This is the chapter that most students find difficult. You definitely need to take extra time here and study this material more carefully. Read the theorems very carefully and note especially under what conditions the theorem can be used.

This chapter can be broken into 3 major parts. The first part is just section 9.1. It is an introduction to sequences and is mainly used to ease you into series,
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which is the second part contained in sections 9.2 – 9.6. There is a table on page 644. Use that a lot as you are studying these sections. It will save you a lot of time on the exam. Also make sure you thoroughly know how to use the Ratio Test in section 9.6. You will be using it a lot in sections 9.7 – 9.10.

The third part is in sections 9.7 – 9.10. Once you wade through the previous 6 sections, these should be easier. There is one major difference between the second part and this third part. Notice in the second part, you have all numbers and indices in your series. In the third part, you will find that now they have a variable (usually x). (These last two sentences will become clearer once you get these sections.)

Read the worksheets in this chapter. I have tried to give you lots of ways to think about and learn this chapter. Also, if you haven’t yet, get the book *How To Ace The Rest Of Calculus*. This book will help you a lot in this chapter.

Most importantly, do not get behind in this chapter! We will be studying this chapter toward the middle of the semester when many students (and sometimes teachers!) have trouble staying focused and motivated. Don’t let that happen to you. Stay ahead of the schedule so that if you struggle with a concept you have plenty of time to get your head around it before moving on.

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CHAPTER 10 --- CONICS

Once you get through chapter 9, chapter 10 should be a breeze. You will be glad to have something much easier to study. Conics are kind of fun. Get your head around what is going on visually with the graphs in the textbook and using your graphing utility. Don’t get bogged down with all the equations. Get a feel for things and the equations will then make more sense.

Chapter 10 also contains a section on parametric equations. These are cool in that not only do you know what the curve looks like, you also know its direction. This will be very helpful if you study electromagnetic fields in physics or engineering.

Finally, we get to look at polar coordinates in section 10.4. These are cool in that many graphs can be described in better and more succinct terms in polar coordinate instead of rectangular coordinates.

There is not as much graphing in this course as there was in calculus 1 (especially if you were in my class) but in this chapter you will need to plot some graphs. Use winplot if you can. It is the easiest to graph parametric equations and the worksheets explain how to do that.

I hope this overview gives you some perspective of where we are going this semester and prepares you for what is coming. It is also meant to whet your appetite. This class can be fun if you are prepared. Just don’t let chapter 9 get you down. You can do this.