Pomona College
Department of Mathematics

Math 31H. Honors Topics in Calculus II

Fall 2018

Course Outline

Time and Place:	MWF 10:00 am - 10:50 am Millikan 2099
Instructor:	Dr. Adolfo J. Rumbos
Office:	Andrew 2287
Phone / e-mail:	ext. 18713 / arumbos@pomona.edu
Office Hours:	TuTh 9:00 am - 10:15 am, or by appointment
Text:	*Approximately Calculus* by Shahriar Shahriari American Mathematical Society, 2006
Prerequisite:	Calculus I or equivalent course (e.g., AP Calculus AB).

Course Description.[1] Math 31H is a second semester calculus class that tries to teach you about the concepts and techniques of Calculus in a novel context. The hope is that, in addition to calculus, you will have a chance to explore some other areas of mathematics. Calculus is a powerful theoretical and practical tool because it allows us to approximate. The purpose of this course is to get an appreciation for the beauty, fun, and nature of mathematics by focusing on the basic ideas of calculus and their relation to other areas of mathematics. The theme for this class is **approximations**. We will see a number of unusual topics—such as using calculus to approximate the number of primes—and we will cover major topics (series of transcendental functions, Differential equations, Taylor series) of second semester Calculus. Whereas in a traditional calculus course much time is spent on developing and perfecting certain specific skills (integrating, applying various convergence tests for series, solving special types of Differential Equations, etc.), in this course we will concentrate on a deeper understanding of concepts. The topics of the course will be covered according to the attached schedule of topics and examinations **(go to the class Sakai site under "Resources" to access this schedule and other course materials**).

Structure of the Course.[2] This course is structured somewhat differently from a traditional mathematics course. You are expected to take an active part in developing the mathematics. A good portion of the material that we cover will be first introduced in homework problems before they are discussed in class. For this reason, collaboration with your peers will be an important (and enjoyable) part of the learning process. In addition, your questions, insights, and class participation will be an invaluable component of the course, affecting both the content and the attraction of the material we cover.

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[1] Taken from Professor Shahriar Shahriari's Math 31H Syllabus
[2] ibid

Assigned Readings and Problems.[3] There will be 3 homework assignments a week and each will consist of 5 problems. Some of the problems will be quite challenging but there will be ample resources to support you. Homework solutions will be collected at the start of each class; we will then proceed to discuss questions students have on the homework problems. All the assignments are listed in the attached schedule of readings and assignments (**available in Sakai under "Resources"**).

Mentor Sessions and Collaborative Learning. There will be three mentor sessions scheduled for the class in the following days and times:

Tuesdays 8:00 pm to 10 pm
Thursdays 6:00 pm to 8:00 pm
Sundays 6:00 pm to 8:00 pm

The meetings will take place in Millikan in a room to be announced soon. The mentor for the class is Rafa Martinez-Avial Palazuelos.
The mentor sessions provide excellent opportunities for you to work with other students in the class. Collaborative learning is strongly encouraged for in this class. You will find that working with others and discussing problems students is the most effective way to learn the material in the class; it is also very enjoyable. Rafa will be there to facilitate discussion and to encourage collaborative learning.

Writing Mathematics in Paragraph Style.[4] On each homework a number of the problems will not be computational. These problems generally ask for a proof or an explanation. In these cases, the solution needs to be written in paragraph style and with complete sentences. Please read sections 1.2 and 2.2 of the text for an explanation of \Writing Mathematics in Paragraph Style."

Writing Clearly vs Showing your Work.[5] In this class, you are not obligated to \show your work" but you are asked to clearly write up your solutions. A \clear write up" is one that someone can pick up and read without knowing the problem or its solution. The purpose of this write up is so that the thinking and the reasoning becomes clear to you. In addition, a month later, you should be able to read your solutions and understand what you did. So, I am not interested in you \showing your work" so that I know that you actually did it yourself. I trust you. However, I want you to write problems clearly (and often using complete English sentences) so that you become a clear thinker. In computational problems, all is required is to write the crucial steps clearly. In problems that involve reasoning and proof, you need to write in paragraph style.

Grading Policy. Grades will be based on the homework, two 50-minute examinations, plus a comprehensive final examination. The grades will be computed as follows:

homework		20%
Two 50-minute exams	50%	
final examination		30%

Final Examination.

Time: Wednesday, December 19, 2018 9:00 am

[3] ibid
[4] ibid
[5] ibid

Place: Millikan 2099