Student Descriptions of Math 497 – Spring 2005

Students in M497 in Spring 2005 were asked to write a paragraph in which they would tell a student considering taking this course what it is about. The following are the responses of all the students who replied. They have not been edited in any way.

1. Math 497 is a great course for students who are looking for an in-depth look at the limit and how it is used in calculus. Through class discussions, reading, and writing, the notion of the limit is hit from all angles preparing students for the day when they have to teach this topic.

2. Math 497 is a detailed look at some of the main ideas and concepts of calculus, with the ultimate goal of making clear the idea of limits. Through some reading and lots of class discussion, the course aims to strengthen one's ideas and thoughts about tangents, area, convergence, and various other parts of calculus. The course only provides what you want to get out of it as far as fun and knowledge, but can be more fun and meaningful than any class you can find with a little bit of effort and an open mind.

3. This course, very basically, is going to be on the limit. By the end of the 10 weeks you will have an incredible insight onto what makes that puppy tick. That's not to say you'll completely understand it, as limits and infinity and infinitesimals and convergence and so on and so forth are loaded ideas. But what you will have for sure is a definite step up on anyone who has never studied it so in depth (i.e. anyone who hasn't taken Math 497) and that will give you a huge advantage on those kids you may or may not eventually be teaching Calculus to once you get out of college.

4. If you are thinking of taking Math 497, take it. This course will take you through the paths that were avoided in the calculus courses. It will finish building the calculus foundation that for most of us did not begin well in the first place. It will certainly be a challenging course if you were not exposed to theory and proofs, but in the end it will train you in mathematical thinking and reasoning.

5. In calculus there are many important ideas that were passed over very quickly, so a real understanding of the subject is thin in places for some people. In this course you will investigate and get a brief (very interesting) history of such concepts as the tangent line, area, limit and reasoning about infinite processes, and last but not least the Fundamental Theorem of Calculus. In class we learn the intimate details of such topics listed and more importantly learn the difficulties of such an examination. By doing this we learn better ways to convey this material to others as we work in groups to attain greater understanding. This class ties up lose ends from calculus and gives a new appreciation and perspective on this wonderful and complicated subject.

6. In Math 497 you get a behind the scenes tour of how calculus works by focusing on the limit and its processes and less on the other parts of calculus. You take calculus to the next level in order to make sense of the parts of calculus

that you did not learn about in the calculus courses. You learn to develop ideas and ways of thinking about one of the central concepts in calculus.   You learn some of the history of calculus and how famous mathematicians contributed to the development of calculus.   This class helps you to grasp the ideas and concepts and what is going on, and forces you to think about calculus in ways that you have never thought of before.

7. Solidifies a student's understanding of what a limit is, proving in various manners that the limit does exist, and can be shown mathematically to exist in very basic problems. Provides multiple examples where the limit is rigorously proved to exist, following some easy to comprehend set of rules in the proofs. It is a useful course for one's own enrichment of calculus and limits, after learning introductory calculus course, and useful aid for teaching an introductory calculus course. I want to stress that this course is not only for potential math teachers, but for everyone who wants a more solid understanding of basic calculus before moving on to higher tiered math.

8. Class begins with an overview of problems of the time of Leibniz and Newton, then moves back in time to early Greek ideas that were rudimentary bases of calculus development, such as Zeno's infinite walk. The "infinite walk" theme is continued to develop the concept of boundedness, and then proceeds to a 'discovery' approach to limits. Students have an opportunity to reveal and correct misconceptions about what limits are and what they do (students will be surprised at their own misconceptions.) Proof is emphasized, and students should be comfortable with the need for proof and rigor. Regardless of individual comfort with proof, students will be required to stretch their understanding – patience is a virtue! The last part of the class is steered towards the two fundamental calculus problems, finding the area under a curve, and finding the slope of a tangent to a curve. These two calculus concepts are presented in relation to a now developed understanding of limit, but they are not deeply unpacked. Students in this course will gain an appreciation of the struggles of Renaissance mathematicians as they create the mathematics of infinite processes.

9. This course made me question my beliefs about limits and whether or not the tangent line exists. My first reaction was that of course the tangent line exists, but how do you explain this? When these ideas are introduced to you in high school calculus, these questions never arise. This course also went in depth in the topic of limits. Is a limit the same as an approximation? This course will answer this question and many more.

10. In Math 497 we examine the nature of the infinite processes that are the underlying foundations of differential and integral calculus. In class we approach calculus and these concepts historically trying to understand where calculus came from and how originally the notion of the line tangent to a curve and the area under a curve were justified by Newton and Leibniz and that their justifications of the reasoning behind these processes were fuzzy at best. We also look at examples found in the history of mathematics of the uses of infinite processes to try to understand their mechanics more deeply and the uses of

infinite processes in solving problems. We approach these topics in the class both philosophically to gain an intuitive understanding and in a rigorous mathematical way to justify their use and the conclusions achieved. Through these three main approaches, historical, philosophical and mathematically rigorous a student hopes to gain a genuine understanding of the concept of infinite processes and the notion of the limit and its uses in the foundations of calculus while gaining some practice in mathematical reasoning and proofs.

11.   I look at this class as a 'philosophy of math' class at the beginning. Why does math work the way it does? Why is it really not magic? Then, it turns into a class on various proofs helping you a) understand the limit and b) write and read proofs with more understanding and ease. This class is interesting because it involves students of various math backgrounds (school teachers, senior math students, etc)

12.   Math 497 is a class centered upon deepening our understanding of what is really going on in the world of Calculus. It begins with a surprising history of the subject, but from there, it moves quickly into the world of infinite processes, as the students in the class are challenged to break down what they know (or think they know) about the fundamentals of the calculus, meaning tangent lines, the area under a curve, limits, and instantaneous speed at a point. This forced breakdown of "what you think you know" must happen, for ideally, over the duration of the course, students' knowledge about these fundamentals of calculus will first be given a firmer foundation, and will eventually be rebuilt, strengthened with new, deeper, and more thorough insight.

13.   This course, along with Math 421, Calculus for Teachers, gave me a new found respect for the subject. This class also helped me gain the confidence one needs in order to go on after college and spread the good word of calculus.

14.   You may think that you know what a limit is, because after all, you have taken an entire year of calculus already. What more is there to know? News flash: the concept of "limit" that you've learned is not really what a limit is at all, but is only a method some guy came up with 300 years ago to solve some math problems (we know him as Newton). In this class, you'll learn exactly what a limit is, and how it's different from an approximation method that most people usually confuse it with. Limits will be represented in real life situations, along with showing how they are applicable in many more areas of math and math problems that you probably could have imagined. At one point, you'll even use your new concept of a limit to determine the sum of an infinite amount of numbers. Although this class is not a requirement for a teaching degree, it seems pretty essential to have this kind of knowledge and understanding of limits if you ever plan on teaching calculus to anyone and having it stick with them.

15.   This course gave me a great knowledge about the limit through many great problems such as the infinite walks, series, etc.….which I didn't get to learn much about in my calculus courses before. It also gave me a better understanding of the tangent line and area under the curve.

16. This course clarifies what exactly a limit is and does. Through reading, lecture and group discussion students start with the very basics of mathematical philosophical questions – Does a tangent line exist? Does area exist? – and build knowledge, proposition by proposition, from the basic properties of the number system through discrete processes and continuous processes, culminating in the Fundamental Theorem of Calculus. Students come away with a deeper understanding and appreciation of the power of the idea of limit.

17.   You wanna talk limits? You got it! In this class, all of my preconceived notions of the concept of the limit were shattered. In previous calculus classes, the instructors and text would have you believe that the limit was merely a notational nuisance that one had to clean up after when analyzing sequences and series. In Math 497, The Study of Limits, we start from the ground up when talking about limits. We start with the history of calculus itself, putting ourselves in the shoes of the Great Masters, and thinking about the problems they encountered and why the notion of a limit arose in the first place. In Math 497, the subject of limits is tackled with the use of diagrams and analogies, and whole class discussions, discussions that reveal that most people who are in the class are all in the same boat: confused about limits.

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