

## Student Descriptions of Math 421 – Spring 2005

*Students in M421 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. This course provides the understanding for why calculus works the way it does. Many times in a high school course you are overwhelmed with many formulas and are simply taught to plug into these formulas. You may think that you fully understand what is going on, but this course will make you think otherwise and question your beliefs. After the first week of this class I began to question my own understandings and previous experiences with calculus, in particular, how the fundamental theorem of calculus works and the major role it plays in calculus. This course gave me a better understanding of that and made me more confident in calculus.
2. Math 421 is a great overview of the machinery of calculus. This course takes an in-depth approach to explaining why calculus works. Through a host of projects, group work, reading and writing, this course gives future teachers the tools to teach calculus
3. Math 421 is a class that teaches students more about the Fundamental Theorem of Calculus. The class begins with the history of Calculus to help the students understand the complexity of Calculus and the development of this branch of mathematics. The second part of the class is devoted to using graphs to prove the Fundamental Theorem of Calculus by understanding how to interpret graphs in not only shape but also in applications in real life.
4. Come get your calculus on in Prof. Monk's "Math 421 Calculus for Teachers" class! For a limited time only, Prof. Monk, along with the University of Washington Department of Mathematics, is offering this in-depth look at the subject of calculus! You'll step into the shoes of calculus's forefathers, Newton and Leibniz, and study the same kinds of problems they encountered in their quest for knowledge, and realize that calculus, like Rome, was in fact NOT built in a day! You'll find out that the notion of derivatives and integrals didn't just fall out of the sky, they were arrived at only after the careful analyzing of very basic mathematical occurrences and patterns, so basic that once you get up close and look at them, you'll say to yourself, "Now why didn't I think of that?!" So get your \_\_\_ in here and get confident about calculus!
5. Math 421 is a very useful course if you want to teach mathematics—calculus and other topics. Teaching is done through class discussion and a lot of group work and problem solving. (If you cannot stand group work, don't take the class

unless you want to challenge yourself.) Homework includes a lot of written assignments (and only a few assignments that are strictly numbers). Writing and being able to communicate your ideas and the logic of what you are saying is highly emphasized in the class.

It is important to have taken calculus before taking Math 421, BUT when in the course you will not be encouraged to use any of your prior knowledge, except perhaps at the end. This is because the goal of the course is to, in a way, relearn calculus as someone who has not before known what it is. What makes it different from other calculus courses, however, is that you learn calculus from a more hands-on perspective; instead of learning equations and then applying them, you look at calculus problems through the lens of someone who doesn't know calculus, and you solve them through other means. The point of this is to get back into the mind of a first-year calculus student for whom integrals and derivatives are confusing and not at all intuitive. What calculus really is at its roots becomes clear over the course of the class. The class begins with calculus history, then moves into applications through scenarios that are understandable to a student who has not seen calculus before, and finally gets to a bit of meaty calculus to tie things together.

After taking Math 421, you will have ideas about how to approach students who are new to whatever math material you are teaching. The class emphasizes the importance of good math teaching, and shows how a comprehensive teaching approach helps students follow the logic of the math and really understand what it is they are learning.

6. Math 421 was like a big discussion group about calculus. A group project was to create a poster that illustrated how the group thought key calculus concepts were connected. Aside from group discussion, personal writing assignments were a large part of the coursework. I wrote many papers about my experiences as a mathematics student and calculus concepts I wanted to understand better. A main goal of the course was to clarify what the Fundamental Theorem of Calculus means and why it is the central relationship in calculus. The first part of the class was devoted to historical aspects of calculus such as its origin as a problem-solving tool and its development into a purely mathematical subject. The reciprocal nature of calculus was taught arithmetically, using number sequences, and visually, using bar graphs.

7. In Math 421, students break down the concepts of calculus and analyze the smaller parts. The class is split up into groups and each group decides on the three core topics of calculus. Each group discusses the importance of these ideas and how they relate to calculus. The class studies the history of calculus how it was created and evolved over the past few centuries. Students then look at discrete and continuous contexts and make generalizations. After each class period, students are expected to comment on what their group discussed and

what they learned. These in-depth investigations help students understand calculus on a completely different level than what they may have learned in high school.

8. This course is a study in the big ideas of Calculus. It then discusses how these ideas came about and you learn about how they are connected. Instead of taking a standard view and approach to Calculus, you look at these concepts from non-traditional views and discuss them in class and in groups. There is a large amount of writing and new students should be willing to express their ideas on subjects. The course will cover ideas already known by the student but in a completely different way so that past knowledge counts for only a fraction.

9. Math 421 is a great way to get an in-depth grasp on calculus and gain the conceptual knowledge of the subject needed to teach high school math. We start the class by reviewing the major themes, or core ideas, of calculus. Then, we study the historical development of the subject. This is a great way of teaching why we study what we do in calculus. The remainder of the class focuses on using the ideas of motion to study the concepts of calculus. By looking at different circumstances, we develop a general knowledge of the subject that can be applied to any situation. And, by the end of a course, we have development a true understanding of the fundamental theorem (round-trip theorem) of calculus.

10. Math 421 is very different than any math class you have taken before. The class forces you to step back from material you may think you know inside and out and forces you to explain why things work the way they do. By analyzing the history and development of calculus you are able to follow the thought processes of Newton and Leibniz and learn where their ideas came from. This class is great for students interested in becoming teachers. By forcing you to explain what you know and why Professor Monk does an excellent job of preparing you to explain concepts to future students. As my dad says great athletes don't always make great coaches. The best coaches are the ones that can break down a skill and explain how it should be done step by step. In the same way the best teachers are those that can teach math by explaining how the concepts work, not by saying "that's just how it is."

11. A typical day in Math 421 usually begins with a general question asked by the professor. He asks students to think about a concept, a passage in the text, etc. and we discuss it in small groups. After a few minutes, we talk as a whole class – often utilizing the white board and other visual resources. Students learn, through these discussions, about the fundamentals of calculus – for example, why is the derivative the rate of change? Or, how is it that integration finds “area under the curve?” So many of the concepts in calculus are taken for granted by

the typical student and this class enables an individual to make the necessary connections in order to get a fuller understanding of the subject. Because there are no exams, only essay-like questions and analysis problems, the student has more flexibility and room for both, personal and academic growth.

12. This course covers the primary topics in calculus in ways that are so elementary it sometimes hurts. You will be surprised at how difficult it is to explain the subject in terms a pre-calculus student would understand. Eventually you will develop a graphical and algebraic understanding of the fundamental theorem of calculus and the main concepts of the subject giving you a better feel for their meaning and motivation as well as a good feel for how to introduce a new student to these concepts. I liked it.

13. In Math 421 you go behind the scenes of calculus and look at calculus in a whole new way. You make in-depth investigations of the ideas and concepts inside calculus. This class helps you to understand the concepts and ideas that you did not learn about in the calculus courses. You investigate many parts of calculus and you learn more about calculus than you thought you ever would. You do things related to calculus that you would have never thought of before this class without even talking about calculus directly. You do calculus without even knowing it. This is a good class if you want to teach calculus because it gives you a deeper understanding of what calculus is and what it can do mathematically.

14. You're going to hear rumors about this class. The rumors will inevitably focus around the Fundamental Theorem of Calculus. However, don't be surprised if those four words are not uttered in the context of the course until the last few weeks of class. History did not just pull the subject together overnight, and this course presents a microcosm of the process that Newton and Leibniz and other mathematicians went through to develop the mathematics that reshaped our thoughts on change, motion, and spatial thought.

15. Forget what you've learned in other calculus classes. In this class, you go back to the basic ideas and foundations of calculus in order to understand them more thoroughly than you would have ever thought you could have. But, the majority of the quarter is spent talking about calculus in everyday language, that anyone (including younger students--hint, hint, future teachers) could understand. You'll get a background of how calculus came to be, how the main ideas relate to one another and how they're set up in the real world, and also how to talk about derivatives, integrals, and anti-derivatives without actually using those terms or the operations you learned in introductory calculus. Although this class is not a requirement for a teaching degree, it seems pretty essential to have this kind of knowledge and understanding of calculus if you

ever plan on teaching it to anyone and having it stick with them.

16. The course was mostly a recap of what you supposedly learned in the Calculus series. It focused more on Math 124 and Math 125, but in different ways. One example is group projects and discussions. This helps the students gather different opinions on how to solve a problem. Another example would be the writing assignments that allow the student to focus on how to teach calculus to other students. So basically the course helps give the student a better understanding of various Calculus topics that will potentially be taught to future Calculus students.

17. Throughout this course you will get to learn some problems that are based on motion. You also get to learn the history of Calculus which most of us don't know much about. You will get to know about the inventors of Calculus and their famous theories and problems. If you have never worked with Excel, this course also gives you a chance to do math using it.

18. I would describe this course as an in-depth study of calculus focusing on the fundamental theorem of calculus. We do various projects and studies of how derivatives and integrals work by looking at different contexts of problems and ways of solving them (such as spreadsheet calculus in Excel). This is an excellent course to take if you want to better understand the underlying ideas of calculus and know exactly what you're doing when you work with derivatives and integrals.