

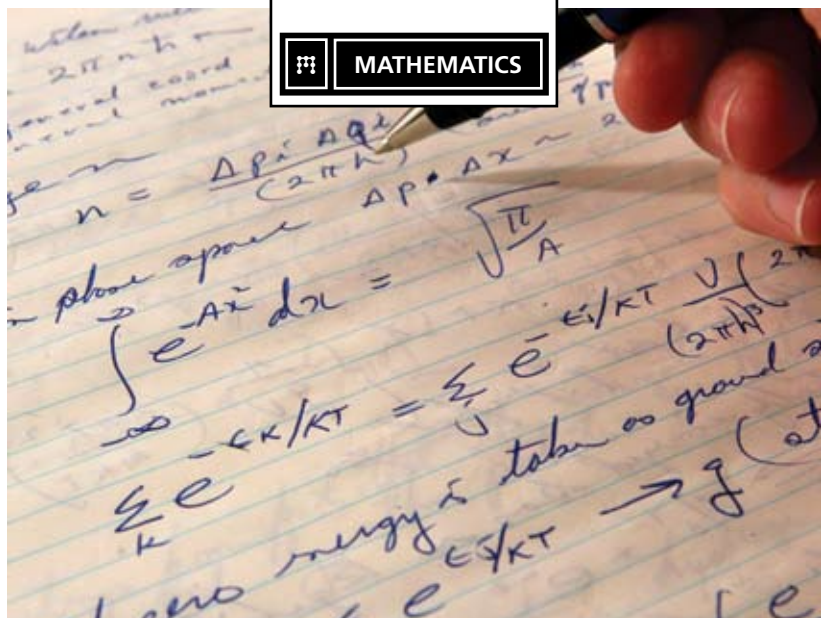
mathematics



Andrews  University

# HELLO

Welcome to Andrews University! We are so glad that you are interested in one of the many programs that we offer in the Department of Mathematics. Here at Andrews, we strive to give you the best possible education. Not just with our superior academics, but also with the many social activities on campus and the wide variety of worship opportunities. And don't forget our teachers! They're really a cut above the rest with their caring attitudes and helpful spirits. If you have any questions, please feel free to connect with us at 800.253.2874 or at [connect.andrews.edu](http://connect.andrews.edu).



**LEARNING MATH CAN BE REAL WORK—JUST LIKE CLIMBING A MOUNTAIN. BUT THE VIEW FROM THE TOP IS WORTH IT.**

Coming out of high school, you have already learned the basics of calculating with numbers and variables. You have explored geometry and learned to create proofs that satisfy both your logical sense and your visual intuition.

Now you are ready to explore “higher mathematics.” This is a vast universe of ideas—limitless, beautiful, and strange—yet useful in many surprising ways. You will construct proofs and build powerful mathematical models that successfully predict reality, and you will learn to understand mathematical concepts down to their deepest roots.

Studying mathematics will strengthen your ability to work logically, clarify concepts, solve problems, and apply analytical tools. A mathematics major shows that you excel in mental facility, work ethic, and abstract reasoning ability. Employers pay very good money for these abilities.

If your plans include graduate study or a profession such as law or medicine, you will be at a great advantage if you are well prepared mathematically. No matter what your path, your new understanding of the world—enabled by mathematics—will be infinitely rewarding.



## **Math is at the Center of Things!**

Many areas of study depend directly on Mathematics—the Andrews Mathematics Department supplies prerequisites for more than 50 courses offered by a dozen different departments in the University!

The computer you use, the shoes you wear, the car you drive—all were made possible by the application of mathematical principles. Without mathematics, it would be impossible to run a corporation effectively, create a CD, or predict the weather (OK, so we're still working on the whole "weather predicting" thing). The standard musical scale, music theory, and the aesthetic principles that form the foundation of Western art, were developed initially from the study of mathematics.

Because of its amazing powers to describe, explain, and predict reality, some early Eastern thinkers regarded mathematics as a mysterious key to divine power. We don't want to turn math into a religion—but you can be sure that studying mathematics will enhance almost anything you want to do in life.

## **The Financial Rewards are Good**

Mathematics-related careers are generally well compensated. According to a 2006 U.S. Bureau of Labor Statistics report, the average annual salary for all mathematicians was \$86,780, with the top 10% of mathematicians earning more than \$132,190 annually ([www.bls.gov](http://www.bls.gov)). Math specialists who move into other disciplines, like physics, finance, or engineering, also earn salaries that are well above the annual average, thanks largely to their mathematical expertise. Manufacturers, financial firms, and government agencies and laboratories, such as the Center for Naval Analysis or Federal Reserve Bank, offer high-paying jobs for people with extensive mathematical training.



## A Mathematics major will enable your career as...

### › A University Professor

Becoming a university professor of mathematics usually requires a PhD degree, either in mathematics or mathematics education. Teaching at the college level requires at least a Master's degree. The first step toward either of these goals is a BS degree in mathematics, which includes the foundations of analysis, algebra, and probability and statistics.

The Andrews University Department of Mathematics has a long tradition of preparing students for success in graduate studies. Andrews mathematics graduates have completed doctorates at the University of Michigan, the University of Wisconsin, the University of Minnesota, and many other distinguished institutions.

"I was planning on majoring in mathematics when I came to Andrews but I didn't expect what awaited me—I've had opportunities to teach, research, and present at a professional conference. I've been surrounded by faculty who genuinely care about me and my professional development. I couldn't imagine going anywhere else."

CHANTEL BLACKBURN, CLASS OF '06





➤ **A High School Mathematics Teacher**

If you are good at mathematics and like to explain concepts and help others learn, there is no finer calling than teaching high school mathematics. There is tremendous demand for capable and qualified high school mathematics teachers. A BS in Mathematics or Mathematics Education, with certification, will prepare you for this exciting profession.

➤ **An Actuary**

Actuaries specialize in the management of risk and play key roles in the insurance and finance industries. Though their work is challenging, they love it and are well paid. (Visit [www.BeAnActuary.com](http://www.BeAnActuary.com) to learn more.) We can help you develop a program of math and finance courses that will get you started toward a career that is consistently rated in the top five.

➤ **A CPA, Financial Analyst, Economist or Systems Analyst**

Strong mathematical training is essential to those wishing to do consulting or research in any field related to money and finance. Systems analysts create the information systems that make businesses and other enterprises work properly.

➤ **An Engineer**

Training for any field of engineering (civil, structural, electrical, computer, mechanical) includes a substantial mathematics component. Mathematical knowledge above the minimum required opens new opportunities and enhances your engineering career.

➤ **A Physician or Attorney**

Strong analytical skills and the ability to think logically and precisely are valuable in both of these professions. A mathematics major is a good choice for pre-medicine or pre-law.

For more information on math careers, visit [www.math.andrews.edu](http://www.math.andrews.edu), click on [About the Department](#), and then [Career Opportunities](#). Three excellent books about careers that use mathematics are *101 Careers in Mathematics*, *She Does Math*, and *Great Jobs for Math Majors* which are available in libraries and bookstores.

## A "SECOND MAJOR" CAN SERVE YOUR CAREER GOALS AND REFLECT YOUR PERSONAL INTERESTS.

Many mathematics majors complete another major in an area other than mathematics, making a truly potent combination. Choose your second major to fit a professional goal or a personal interest. Here are some excellent combinations:

### **Math-Physics**

Physics is traditionally considered to be the most math-intensive scientific discipline, and Andrews has one of the finest physics departments to be found in a small university. Physics majors are required to take all but one of the courses required for a mathematics minor, and many of them take a mathematics major.

### **Math-Chemistry**

Andrews University is one of a select group of institutions which offers an American Chemical Society (ACS) accredited undergraduate degree in chemistry. A double major in chemistry and mathematics offers an extremely marketable degree.

### **Math-Computer Science**

Computer Science is a mathematics-based discipline, and a strong mathematical background is essential for students who expect to pursue graduate studies in this field. Many of our best mathematics majors are also computer science majors.

### **Math-Economics/Finance**

In today's increasingly interconnected global economy, high-level mathematics has become an essential tool for both economists and financiers. Many financial firms, corporations, and government organizations hire largely on the basis of mathematical proficiency. Graduates in economics and finance with a BS in Mathematics are highly qualified for employment or for pursuing graduate study in those fields.

### **Math-Biology**

Andrews University is an exciting place for students wanting to get in on the ground floor of one of the hottest new areas of research—mathematical biology. The Seabird Ecology Team at Andrews is an interdisciplinary research group funded in part by the National Science Foundation. It offers undergraduate students support and research experience in modeling animal behavior, under the direction of Dr. Shandelle Henson, a highly respected scholar in the applications of dynamical systems theory to biological populations.

### **Math-Behavioral Neuroscience**

The Behavioral Neuroscience program provides many opportunities for students wishing to study Behavioral Science, Biology and Mathematics. A major grant from the National Science Foundation supports this program, which allows students to study the brain and its control of behavior.

### **Math-English**

The actual process of doing mathematics may not be verbal, but clear communication of mathematical ideas is a persistent challenge. Mathematicians who can express concepts clearly and writers who possess the logical clarity and rigor promoted by mathematical study can “write” their own tickets to professional success. A Math-English degree is especially good preparation for the study of Law.

### **Math-Music**

Many professional mathematicians are also accomplished classical musicians, and if you’re talented in these areas, don’t hesitate to pursue your interests in both. To learn more about the fascinating connection between mathematics and music, check out Edward Rothstein’s book, *Emblems of Mind: The Inner Life of Music and Mathematics*.

**The sky is the limit! Go ahead and invent your own combination of majors to suit your interests.**



**Choose Andrews** During the past several years, the number of students declaring themselves as mathematics majors at Andrews has grown to more than 30. More and more students are discovering that mathematics opens up a world of career opportunities.

**A Tradition of Excellence** For more than 50 years, the Andrews mathematics program has been recognized for producing students who excel in graduate work and professions. You will study in a Christian setting with professors who are dedicated to your personal and spiritual development. Your teachers are known, not only for their scholarship, but for helping their students find the best professional opportunities.

**Pi Mu Epsilon** Andrews University is home to the Michigan Gamma Chapter of Pi Mu Epsilon, the national mathematics honor society. Students who qualify for membership may receive travel money to attend the summer MathFest and rub shoulders (and ideas) with top math students from all over the country. In 2005 an Andrews mathematics major, Chantel Blackburn, walked away with top national honors for her paper presented to the Pi Mu Epsilon session at the MathFest in Albuquerque, NM. (Credit must also be given to her mentors at Grand Valley State University, where she participated in the summer Research Experience for Undergraduates program, funded by the National Science Foundation.)



**Undergraduate Research** It's rare for mathematics students to gain significant research opportunities at the undergraduate level, but that's the opportunity math majors have at Andrews. In 2005, Kami Lizarraga, a senior mathematics student, co-authored a research paper with Professor Joon Kang. Currently, two National Science Foundation grants support opportunities for biology, behavioral science, and mathematics students to engage in scientific research in mathematical ecology and behavioral neuroscience. Under one of these grants, Clara Logan, a member of the Seabird Ecology team, traveled to Protection Island to collect data, and co-authored three research papers with Dr. Shandelle Henson. These papers have appeared in top research journals.

**Dynamic Atmosphere** The Department of Mathematics is proud that its students come from many cultures and backgrounds. Three of five mathematics faculty and about half their students are women, a great advance in a discipline that used to be male-dominated. We are also pleased that nearly half of our mathematics majors are from minority and under-represented groups in mathematics and science. No matter what your background, you'll feel at home in the Andrews Department of Mathematics.

As a math major, you'll become involved with Eigen, the Physics and Math Club. Eigen sponsors occasional Friday EigenVespers at faculty homes, EigenTrips (weekend backpacking campouts), and regular Friday EigenTalks complete with entertaining lectures and food. As one of the club's elected officers, you can have your hand in planning Eigen functions.



## CHOOSE ANDREWS

### Scholarship and Student Work Opportunities

Math majors typically win substantial academic scholarships based on their ACT/SAT scores, and the Department offers several named scholarships as part of the Andrews Partnership Scholarship program. The Department hires students as tutors in the Math Tutoring Center, as readers to grade homework assignments, and as supervisors for lab sections of certain courses. Mathematics majors get priority when these jobs are assigned. They are regarded as skilled work and pay somewhat better than the average campus job.

The Department of Mathematics participates in research in Seabird Ecology at Protection Island, Washington. By evaluating various environmental influences, the team is creating models of seagull and seal populations on the island shore. Part of the Seabird Ecology Team, from left to right: Dr. James Hayward, Biology; Christina Burden, Biology major; Dr. Shandelle Henson, Mathematics; Clara Logan, Mathematics major.





**Be Successful!** Here are some tips that can help you make the transition from high school senior to college math major:

**First**, take as much math as you can in high school. You should take Algebra I, Geometry, Algebra II, and Precalculus if it's offered. If your school offers Advanced Placement Calculus, a sufficiently high score on the AP examination will move you quickly to higher level math classes.

**Second**, score well on the Andrews Mathematics Placement Examination (MPE). Most math majors score P5 (the highest possible score) on the MPE when they first come to Andrews. If you get a lower score, you can take Precalculus at Andrews and still do well. If you present AP Calculus credit, you do not have to take the MPE.

**What to Expect** Your serious mathematical study will start with Calculus I, II, and III. After Calculus, many doors open. You will want to take Differential Equations (finding solutions of equations involving derivatives of functions), Introduction to Linear Algebra (a powerful extension of the study of simultaneous linear equations), and Statistics and Probability. All these are studies with many applications in science, technology, and business.

Try to take Discrete Mathematics as soon as possible, preferably in the spring of your first or second year. In this course you will learn the fundamentals of logic and proof on which many of your advanced courses will depend.

Many areas of mathematics were developed "just for the fun of it" and have important applications (the ancient Chinese and Greek study of number theory is a good example). Part of your training will be in "pure" mathematics—its power is so great that no applied mathematician can afford to be ignorant of it.



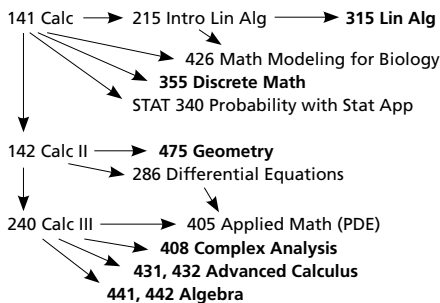
Advanced Calculus teaches you how to think with complete precision about the ideas of continuity and limit that you explore first in Calculus. Abstract Algebra (groups, rings, and fields) is a great unifier of mathematics. By developing theorems from very simple axioms, we save ourselves the labor of generating duplicate theories for different mathematical structures. Geometry is important for understanding the nature and structure of spatial relations.

*The accompanying chart shows several possible paths through your undergraduate mathematics studies.*

*Read from top to bottom, and left to right. The arrows go from "prerequisite" courses to those they prepare for. Not shown in chart: Discrete Math is a prerequisite for Geometry, Complex Analysis, Advanced Calculus, and Algebra.*

**Table of courses and dependencies:**

Courses in **bold** are "pure" mathematics

**Degree Programs**

(credit hours in parentheses)

BS: Mathematics (39) with emphases in:

- Applied Mathematics
- Preparation for Secondary School Mathematics Teaching
- Preparation for Graduate Study in Mathematics

BS: Mathematics Education (30)

Major in Mathematical Studies (30)

Minor in Mathematics (20)

Minor in Mathematics Education (20)

Minor in Mathematics of Economics and Finance (20)



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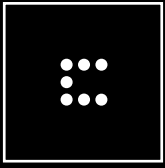
**ABOUT THE COVER:** The Department of Mathematics participates in research in Seabird Ecology at Protection Island in Washington. The cover picture was taken a bit closer to home - these gulls are at Weko Beach on Lake Michigan, about 12 miles from the Andrews Campus.



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let's be scientific, let's be imaginative, let's be energetic, let's be radical, let's be perceptive, let's be complementary, let's be creative, let's be precise, let's be equal, let's be connected.



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**MATHEMATICS**

