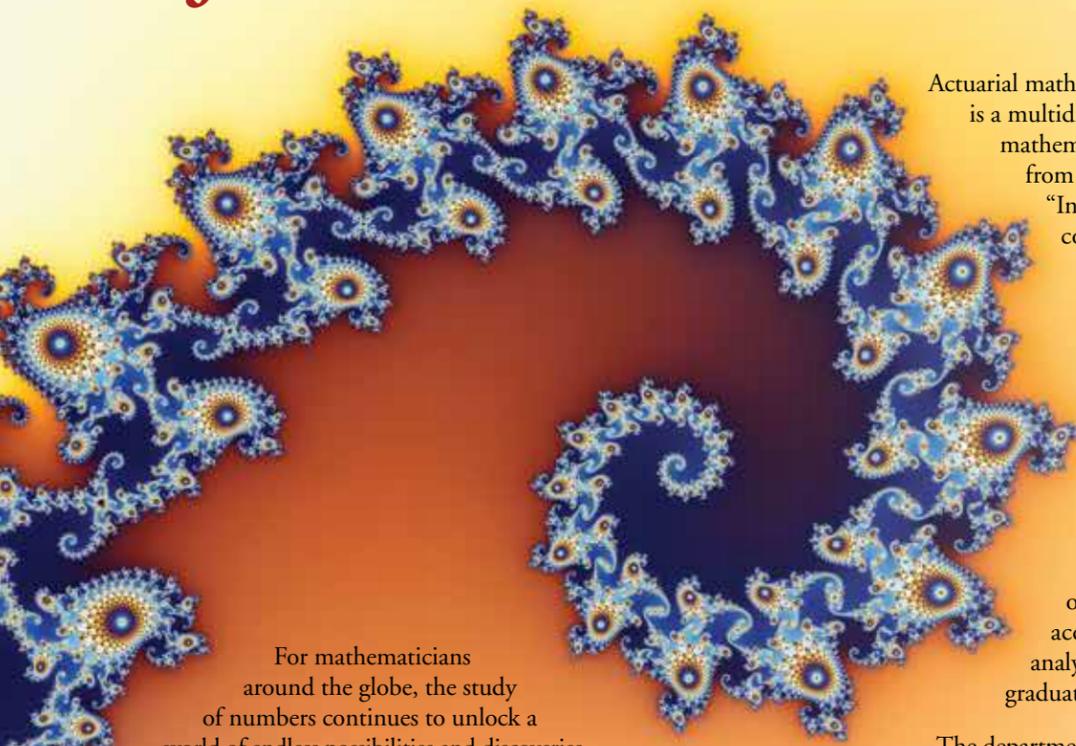


DEPARTMENT OF MATHEMATICS:

*Opening Minds to the Beauty
of the Universe*



For mathematicians around the globe, the study of numbers continues to unlock a world of endless possibilities and discoveries.

Mathematicians explore calculus, modern algebra, and other high-level math in its purest form to solve not only abstract problems but also practical problems that affect daily living. While math can be a mysterious and completely unfamiliar language to some, the students who study this unique language learn how to use it to describe the beauty and nature of the world.



The Department of Mathematics in the University of Pittsburgh Kenneth P. Dietrich School of Arts and Sciences offers programs leading to degrees in mathematics, applied mathematics, mathematical biology, and actuarial mathematics as well as a joint degree program in mathematics and economics. A degree in math provides students with an excellent foundation on which to build a career in virtually any high-technology field and offers a particularly strong basis for advanced study in science, engineering, or finance. Students are trained in classical mathematics in addition to being exposed to ideas on the cutting edge of current research.

“The math department is committed to excellence in undergraduate and graduate training as well as in research and scholarship in pure and applied mathematics,” says Ivan Yotov, professor and chair of the department. “Our faculty members conduct active research in a broad range of areas, from algebra, analysis, and geometry to mathematical biology and mathematical finance to numerical analysis and scientific computing.”

The newest program to be added to the department’s rigorous curriculum is the mathematical biology major. This major develops students’ proficiency in thinking mathematically about biological systems. Through this 43-credit program, students acquire fundamental skills in mathematical analysis and simulation, specialized experience in mathematical modeling in biology and neuroscience, and knowledge of particular areas of biology. “These courses provide students with the expertise needed to participate in undergraduate research projects as well as for them to advance to using quantitative methods in biotechnology, medicine, and other fields,” says Jonathan Rubin, professor in the department.

Actuarial mathematics, another recently added major, is a multidisciplinary course of study in applied mathematics with a focus on applications from the insurance and financial industries.

“In addition to a standard suite of courses common to all degree programs in mathematics, our students are required to take courses in statistics, economics, business, and computer science that are central to modern finance,” says John Chadam, professor in the department. “The program is built around courses that prepare students for the four exams of the Society of Actuaries and the Casualty Actuarial Society.” Chadam further explains that because the program is housed in the Department of Mathematics, graduates of the program acquire broader, more sophisticated analytical skills and are better prepared for graduate work at the MBA and PhD levels.

The department continues to review and revise its curriculum to support new programs and to satisfy the diverse interests of students, explains Frank Beatrous, professor and undergraduate director. “Recent additions include courses in mathematical biology, computational neuroscience, life contingencies, Fourier analysis, and mathematical cryptography. Of particular interest is a new problem-solving course developed by lecturer Jeff Wheeler in which students work in teams to tackle real problems from business, industry, and government.”

The math department encourages its 344 majors to become involved in activities outside the classroom. During the academic year, the department brings in industry leaders and widely acclaimed academicians to speak at weekly colloquiums and research seminars. In addition, undergraduates across all disciplines have a unique opportunity to research a specialized topic and present their findings at weekly math seminars organized and chaired by Wheeler, who, with local professionals, also conducts a yearly interviewing seminar that provides students with valuable tips on how to prepare for job and graduate school interviews.

Departmental advisors welcome the opportunity to speak with students who are considering math as a field of study. For more information, visit mathematics.pitt.edu.

DID YOU KNOW?

- The Mathematics Research Center, established in 2011, encompasses a broad range of research areas, with ongoing activities that include a distinguished lecture series, workshops, mini conferences, and a postdoctoral program.
- The CareerCast “Best Jobs of 2014” list ranked mathematician at the top of the list, with actuary coming in fourth.
- Undergraduates are actively involved in faculty research projects, working on such topics as brain rhythms of olfaction, escape of particles with Brownian motion, and autohomeomorphisms of the plane and Cantor set.
- The department’s faculty have excelled in research, with 41 active research grants totaling nearly \$6.9 million. Faculty members also have received prestigious national and international awards such as the Leslie Fox Prize in Numerical Analysis, Sloan Research Fellowship, Chancellor’s Distinguished Research Award, Tina & David Bellet Teaching Excellence Award, Paul R. Halmos-Lester Ford Awards, Delbert Ray Fulkerson Prize, and Mathematical Neuroscience Prize and are fellows of the American Mathematical Society and the Society for Industrial and Applied Mathematics.



MESSAGE FROM THE ASSOCIATE DEAN

Exploring the Majors

The Kenneth P. Dietrich School of Arts and Sciences offers more than 100 undergraduate majors, minors, and certificates amid more than 1,000 classes. There is no limit to the possibilities or opportunities for all students to hone their existing skills and discover new strengths. While some students have already declared their major upon entering the Dietrich School, many more students are still exploring and discovering their academic options.

We encourage students to reach out to their academic advisors early and often before choosing a major or field of study. Our academic advisors are dedicated to achieving student excellence by engaging students in conversations about their educational and career goals and helping them to discover their personality strengths and skills. As partners in the process, students should come prepared to discuss what they like to do and what makes them curious and excited to learn more. Assessing what courses appeal to them and which subjects truly motivate them is essential in determining a particular field of study. However, students need not limit themselves to only one major. Approximately one-third of Dietrich School students double major, and many others choose a minor to complement their course work.

Our advisors urge students to take a diverse set of classes before deciding upon a particular academic path. In addition to enrolling in courses that they like or that are familiar, students also should take courses outside their comfort zone. A class that they originally hadn't planned on taking could open up a whole new world for them and in the process help them to discover a passion and career path they didn't know existed or hadn't yet considered.

Enrolling in summer classes is an excellent way for students to navigate and discover their interests without the pressure of a full class load. To find out more about summer sessions course offerings and registration, visit summer.pitt.edu. Internships and research opportunities also provide extraordinary opportunities for students to work with faculty members and gain valuable knowledge and hands-on experience.

Above all, it is important for students to remember that when they choose a particular field of study, it will not constrain their final career choice. The Dietrich School prepares students to enter a wide range of careers once they graduate. Selecting a major is not the same as choosing a job. Many employers are looking for educational acumen and abilities appropriate for the complexities of the modern workplace—the ability to problem solve, work in teams, write and communicate effectively, and think critically. A liberal arts education provides these lifelong competencies that enable students to pursue graduate studies successfully or go out into the workforce and flourish as citizens of the world.

John A. Twynning, PhD

Associate Dean for Undergraduate Studies



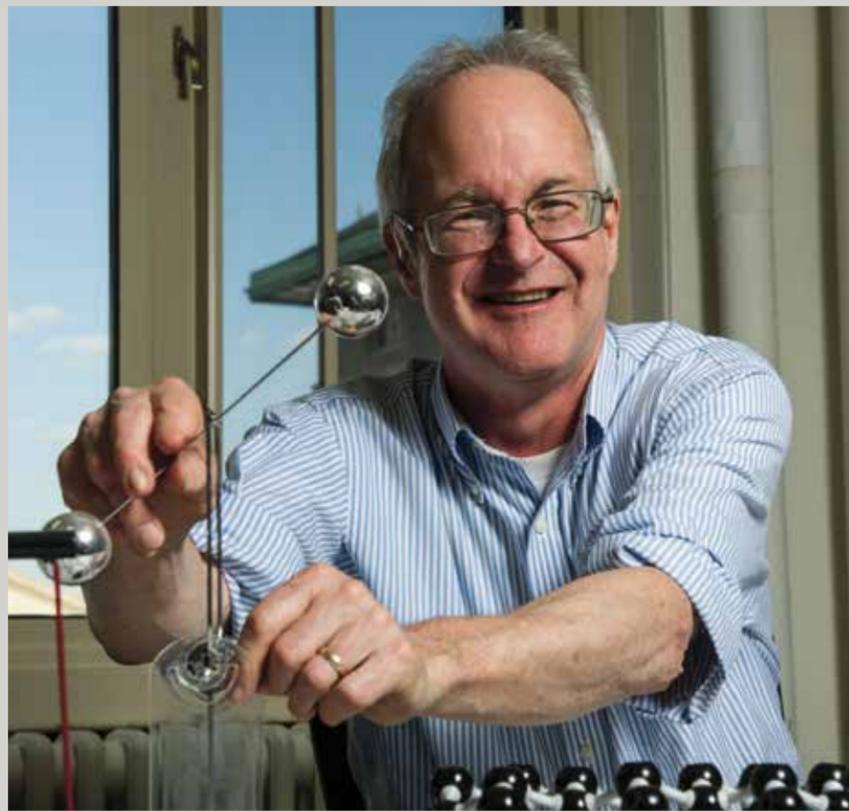
FACULTY PROFILE

Discovering Answers to Nature's Patterns

Whether he is researching the synchronization of patterns on seashells, investigating why viruses inflame the immune system, or exploring the mechanics of how toys move, G. Bard Ermentrout is enthralled by how things change with time through dynamical systems. Ermentrout is Distinguished University Professor of Computational Biology and a professor in the Department of Mathematics. After teaching for more than 30 years at Pitt, Ermentrout's fascination with mathematical biology continues to grow exponentially.

"Mathematical biology is a young, emerging, interdisciplinary field. The study of mathematical biology is absolutely phenomenal and awesome because we can get to the root cause of many phenomena in nature just by analyzing patterns in space and time," says Ermentrout. "No matter what it is, from fingerprints to ant trails, we are always looking for a mechanistic explanation."

Ermentrout's interest in mathematical biology came to light as an undergraduate premed math major. After finding and reading "Towards a Theoretical Biology," an article in the journal *Nature*, his interest shifted to math biology, and he consequently gave up his dream of going to medical school. Instead, he went on to study at the University of Chicago and wrote his dissertation on mescaline hallucinations. His research interests focus on the application of non-linear dynamics to biological problems as well as studying mathematical neuroscience in an effort to understand the patterns of activity in networks of neurons. In his research laboratory, he models recurrent activity, waves, and oscillations in a variety of neural systems.



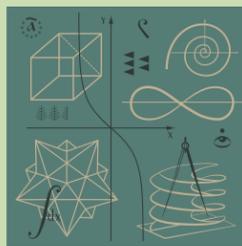
Ermentrout has written more than 200 papers total on every organ in the body except for the kidneys. He was a 2015 recipient of the Mathematical Neuroscience Prize, an award that recognizes researchers worldwide who have significantly advanced the understanding of the neural mechanisms of perception, behavior, and thought through the application of mathematical analysis and theoretical modeling. He coauthored the book *Mathematical Foundations of Neuroscience* (Springer, 2010) and wrote XPPAUT, a software platform for the simulation and analysis of nonlinear dynamical systems, now available on iPhones and iPads. In 2008, Ermentrout received the Chancellor's Distinguished Research Award, and in 2012, he was named a fellow of the Society for Industrial and Applied Mathematics.

Ermentrout encourages students to take advantage of all research opportunities at Pitt, including getting involved in the First Experiences in Research program offered through the Office of Undergraduate Research, Scholarship, and Creative Activity. "The University of Pittsburgh is such a big place. There are incredible opportunities here to do research, and the door is open to all undergraduates," says Ermentrout. "My advice to students is to take as much math as possible, get their hands dirty in doing research, and above all find a mentor. I had a phenomenal undergraduate advisor who encouraged my interest in research and number theory."

Ermentrout takes his enthusiasm and love for mathematical biology into the classroom. "I like to bring in popular culture, including the modeling of zombies, to keep students engaged and interested," he says. In fact, Ermentrout and his son, Kyle, coauthored a chapter in the book *Mathematical Modelling of Zombies* (University of Ottawa Press, 2014), which examines how mathematics can predict the unpredictable. Outside his laboratory, Ermentrout is an avid cook and gardener.

For more information on Ermentrout and his research, visit mathematics.pitt.edu.

Problems Solved at MAC



The Math Assistance Center (MAC) is a bustling place, with tables filled with students and tutors engrossed in textbooks and reviewing linear, quadratic, polynomial, exponential, and logarithmic functions or standing at whiteboards graphing algorithms. MAC, which is located in the O'Hara Student Center, provides free walk-in math tutoring services for undergraduate students.

Students seek out the resources of MAC for many reasons, including for clarification about math concepts or ideas, for help with a particular problem, or to review course material prior to midterms and final exams. With more than 100 tutors who are graduate and undergraduate teaching assistants, MAC provides students with answers to questions about math topics ranging from college algebra to scientific calculus.

MAC's director, Neale Hahn, encourages all students taking math classes to visit MAC and to strive to improve their knowledge and understanding of mathematical concepts. The earlier students come to MAC for assistance, the better equipped they will be to move forward successfully in their math studies.

To learn more, visit mathematics.pitt.edu/about/math-assistance-center.

FUTURE LEADERS LEARN TODAY

The Elegance and Beauty of Math

Very early on in his childhood, it was evident to Daniel Salmon that he loved math and, even more so, loved applying his math skills to solving everyday problems. He grew more and more intrigued to find something in nature that could not be solved using math formulas and equations. In high school, his interests expanded to physics and economics, and by adding math to the equation, he enrolled in a trifecta of subjects that he loved. Now a senior in the University of Pittsburgh Kenneth P. Dietrich School of Arts and Sciences, Salmon is completing a triple major in mathematics, physics, and economics.

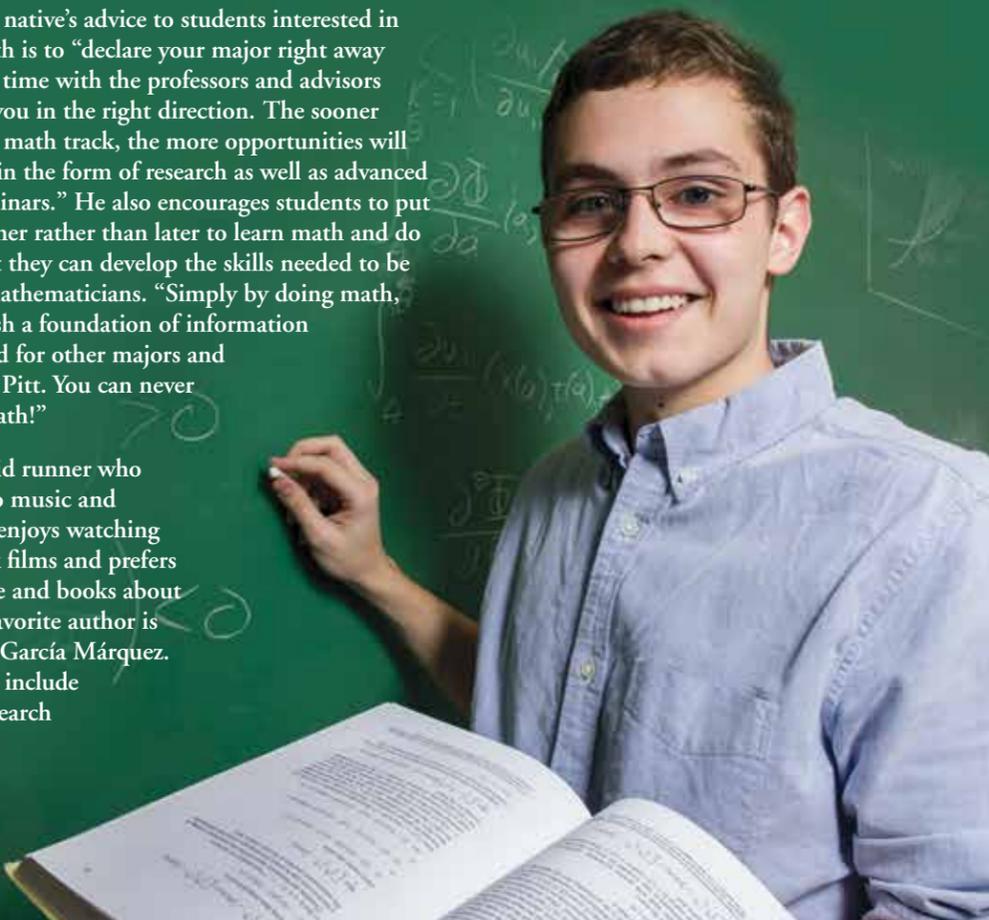
“I find that there is such an elegance and beauty to pure math,” says Salmon. “The joy of working on precise theory that has been developed and refined over centuries and quickly and easily proving something that for hundreds of years mathematicians could not is incredibly rewarding. I believe that math, more than any other subject, connects so many areas that are disparate in a compact and remarkable way.”

Salmon also concurs that math provides the ability to stimulate the mind and work the brain in a unique way. “Taking all levels of math enabled me to read at a certain level and fostered an intuition that I then applied when encountering problems in other courses,” explains Salmon. “The most important skill I gained from math is remembering the ideas and concepts behind the math. This skill is malleable and easily translates to other fields and majors. For instance, my work in theoretical physics allowed me to translate math into workable models to describe nature and explain phenomena in the world.”

Salmon received a full-tuition scholarship from the University Honors College as well as a summer undergraduate research award from the Dietrich School and a NASA Pennsylvania Space Grant Consortium research scholarship. As a freshman, he dove right into research activities and traveled to Spain as a collaborator on a computer programming model project. “Conducting research is such a rewarding experience, and it is an exciting way to delve deeper and explore new subjects,” he says. Currently, Salmon is investigating incarceration rates in the South during the Reconstruction period.

This Pittsburgh native’s advice to students interested in majoring in math is to “declare your major right away to gain valuable time with the professors and advisors who will point you in the right direction. The sooner you start on the math track, the more opportunities will come your way in the form of research as well as advanced courses and seminars.” He also encourages students to put the work in sooner rather than later to learn math and do the work so that they can develop the skills needed to be accomplished mathematicians. “Simply by doing math, students establish a foundation of information that may be used for other majors and other courses at Pitt. You can never learn enough math!”

Salmon is an avid runner who loves to listen to music and read books. He enjoys watching Terrence Malick films and prefers to read literature and books about literature. His favorite author is the late Gabriel García Márquez. His future plans include teaching at a research university.



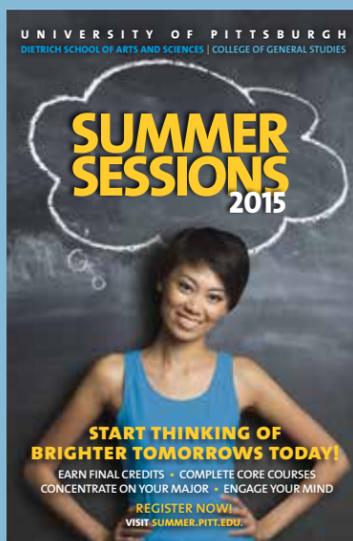
Registration for Summer Sessions Continues

Is your student undecided about an academic major or specialized field of study? Does he or she still have general education requirements or prerequisite courses that are not yet completed? Would adding a second major, a minor, or a certificate complement his or her academic experience and enhance his or her professional opportunities?

Summer sessions at the University of Pittsburgh provide an exciting opportunity for students to catch up on needed credits, stay on track to graduate in four years, or get ahead of schedule for the fall term. Summer sessions classes are designed to help students reach their educational goals no matter where they are in their academic careers.

During the summer, students can complete general education or specialized requirements, finish core and prerequisite courses, or enroll in popular courses and labs that fill quickly during the academic year. Summer sessions also provide opportunities to explore subjects without the pressure of a full class load. With the flexibility of enrolling in classes during 4-, 6-, and 12-week sessions, students can take summer classes without forgoing summer jobs, internships, or family vacations.

For more information on specific course offerings in all disciplines, students should talk with their advisor or visit summer.pitt.edu.



ROOMMATE CHALLENGES

by Mary Koch Ruiz, University Counseling Center

Living with a roommate can present challenges. Conflicts may ensue due to the stress of sharing a living space. While roommate conflicts are normal, it is important to be open to learning how to handle the conflicts with patience, respect, maturity, and creativity.

Conflicts between roommates can occur because of some of the following issues:

- neatness or lack of it (different lifestyles)
- differences in study habits
- “borrowing” of possessions without getting permission; not returning borrowed items
- overnight guests
- expectations not expressed
- noise; lacking consideration for the other
- differences in values regarding alcohol and/or drugs
- differences in social styles (homebody vs. partygoer)
- money matters (borrowing without repaying; constantly borrowing)
- housecleaning responsibilities

Tips for Parents

Many students confide in their parents when they are experiencing a roommate conflict. The following are some strategies to discuss when asked how to respond to difficulties with a roommate relationship:

- Provide help in understanding the difference between feeling annoyed versus feeling hurt and angry.
- Encourage direct communication with the use of “I” statements rather than “you” messages.
- Encourage your son or daughter to see a counselor in the University Counseling Center for support and assistance with handling conflicts effectively.
- Suggest mediation with a resident advisor if your son or daughter is uncomfortable talking alone with a roommate.
- Encourage your son or daughter to create a contract with his or her roommate to establish rules for housecleaning, overnight guests, sharing items (including food), smoking, and study arrangements.
- Discuss the importance of compromise; equal giving and taking are necessary components of healthy relationships.
- Encourage tolerance, open-mindedness, respect, and objectivity.

RESOURCES

University Counseling Center
Wellness Center
Mark A. Nordenberg Hall
Second Floor
111 University Place
412-648-7930
counseling.pitt.edu

Common Roommate Problems
scholarships.com/resources/campus-life

“Seven College Roommate Conflicts—and Solutions”
mercurynews.com/bay-area-living/ci_23808199/seven-college-roommate-conflicts-and-solutions

IMPORTANT CONTACTS

Advising Center	412-624-6444
Academic Resource Center	412-648-7920
Office of the Associate Dean for Undergraduate Studies	412-624-6480
Office of Undergraduate Research, Scholarship, and Creative Activity	412-624-6828
Office of Freshman Programs	412-624-6844
Office of Student Records	412-624-6776

asundergrad.pitt.edu

Questions or concerns? E-mail us at pittpride@as.pitt.edu.



University of Pittsburgh

Kenneth P. Dietrich School of Arts and Sciences

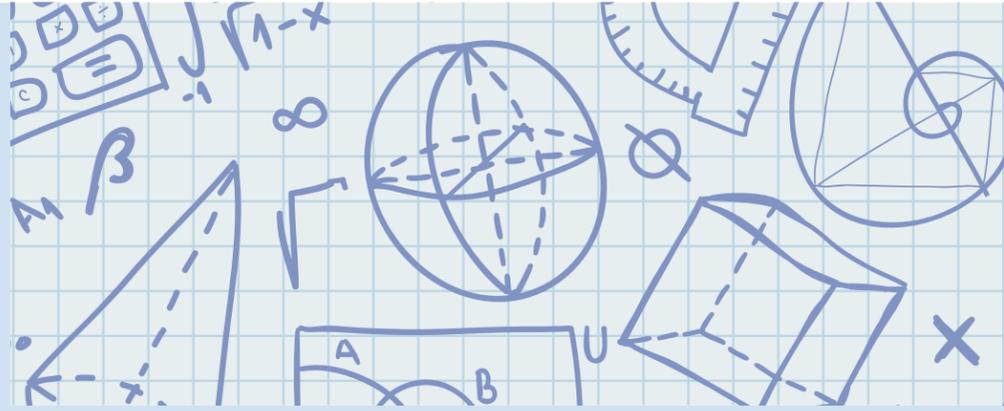
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Math Competition Unites Students Across Pitt's Campus

Students from disciplines across the University of Pittsburgh campus participated last month in a high-spirited competition of evaluating integrals at the 2015 Integration Bee sponsored by the Department of Mathematics and the University Honors College.

Under the direction of Jonathan Rubin, professor of mathematics, this fast-paced competition requires participants to correctly evaluate indefinite or definite single-variable integrals in the time allotted. Participants take turns working the problems, with each participant having the opportunity to call up one lifeline for a 20-second consultation during the competition. After two rounds, all remaining contestants compete in a head-to-head lightning round to see who can correctly evaluate the next integral the fastest. Each year, approximately 30 undergraduates participate, with about one-third making it through two rounds of integration to go into the final round.



Winners of this year's Integration Bee were Derek Orr, mathematics and physics major, first place; Thomas Bednar, mathematics and computer engineering major, second place; and Konstantin Borisov, mathematics, molecular biology, and chemistry major, third place.

Held in conjunction with the math department's competition is a local high school edition of the Integration Bee, cosponsored by the Kenneth P. Dietrich School of Arts and Sciences' College in High School program and Anna Vainchtein, associate professor of Mathematics. Participation is open to local high school students.

CALENDAR OF EVENTS

April

- 25** Spring term ends; official date for awarding of degrees
- 26** Annual Commencement Convocation; residence halls close (except for graduating seniors)
- 29** Spring term grades must be approved by instructors by 11:59 p.m. before final posting can begin

May

- 3** Residence halls open for summer term
- 4** Summer term enrollment period ends and classes begin
- 11** Summer 12-week, 6-week-1, and 4-week-1 sessions enrollment period ends and classes begin
- 13** Summer 4-week-1 and 6-Week-1 sessions add/drop period ends
- 15** Summer term add/drop period ends
- 18** Summer 12-week session add/drop period ends
- 25** Memorial Day; University closed
- 27** Summer 4-week-1 session deadline for students to submit Monitored Withdrawal forms to the dean's office

June

- 5** Summer 6-week-1 session deadline for students to submit Monitored Withdrawal forms to the dean's office
- 6** Summer 4-week-1 session ends; final examinations scheduled during last class meeting
- 8** Summer 4-week-2 session enrollment period ends and classes begin
- 10** Summer 4-week-1 session grades must be approved by instructors by 11:59 p.m. before final posting can begin; summer 4-week-2 session add/drop period ends
- 20** Summer 6-week-1 session ends; final examinations scheduled during last class meeting; official date for awarding of degrees
- 22** Summer 6-week-2 session enrollment periods ends and classes begin
- 24** Summer 6-week-1 session grades must be approved by instructors by 11:59 p.m. before final posting can begin; summer 6-week-2 session add/drop period ends; summer 4-week-2 session deadline for students to submit Monitored Withdrawal forms to the dean's office

For the online academic calendar, go to
provost.pitt.edu/information-on/calendar.html.

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DIETRICH SCHOOL OF ARTS AND SCIENCES
THE PITT PRIDE

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The University of Pittsburgh, as an educational institution and as an employer, values equality of opportunity, human dignity, and racial/ethnic and cultural diversity. Accordingly, as fully explained in Policy 07-01-03, the University prohibits and will not engage in discrimination or harassment on the basis of race, color, religion, national origin, ancestry, sex, age, marital status, familial status, sexual orientation, gender identity and expression, genetic information, disability, or status as a veteran. The University also prohibits and will not engage in retaliation against any person who makes a claim of discrimination or harassment or who provides information in such an investigation. Further, the University will continue to take affirmative steps to support and advance these values consistent with the University's mission. This policy applies to admissions, employment, and access to and treatment in University programs and activities*. This is a commitment made by the University and is in accordance with federal, state, and/or local laws and regulations.

For information on University equal opportunity and affirmative action programs, please contact: University of Pittsburgh; Office of Affirmative Action, Diversity, and Inclusion; Carol W. Mohamed, Director (and Title IX, 504 and ADA Coordinator); 500 Craig Hall; 200 South Craig Street; Pittsburgh, PA 15260; 412-648-7860.

For complete details on the University's Nondiscrimination Policy, please refer to Policy 07-01-03. For information on how to file a complaint under this policy, please refer to Procedure 07-01-03.

*Except where exempt by federal or state laws.

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