

COUNTABLE BITS

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Student Awards

The Florian Cajori Award for outstanding achievement in mathematics or computer science among seniors goes jointly to Evan Ranken and Nick Pascucci. The Sophie Germain Award, which recognizes a senior who displays a special love for mathematics and a drive to succeed, goes to Rebecca Mitchell.

Each year the department challenges our students with the Rawles Exam, a collection of diabolical puzzlers dreamed up by our faculty. This year's winner among upper division students was Evan Ranken, and the winner among lower division students was Hanson Smith. Congratulations!

Computer Science Tenure Track Hire

Two years ago, we bid a fond farewell to Jonathan Bredin, who left CC to take a job in the private sector in Houston (and closer to his wife!). This past year, the department conducted a national search for a new tenure track professor of computer science. After screening many wonderful applications, we offered the position to our visiting computer scientist, Matthew Whitehead. To our delight, Matthew accepted the offer and is now a tenure track member of the CC faculty! Matthew hails originally from Washington state, and received his Ph.D. from Indiana University. His expertise is in artificial intelligence and machine learning; he has worked on projects ranging from using genetic algorithms to evolve characters in computer games to mining user opinions from the web to automatic news summarization (with CC student Sam Johnson). Our computer science faculty are asked to teach a wide range of classes, and Matthew has already demonstrated his versatility by teaching well-received courses including Computer Science 1, Probability and Statistics, Database Systems, and Artificial Intelligence. Matthew says: "When I'm not stuck at my computer I can usually be found bicycling, hiking, playing tennis/racquetball/badminton, playing guitar rather poorly, reading, playing video games, baking bread, playing board games, writing poetry and fiction of questionable artistic value, watching sports, or generally annoying my wife, Madhuja, and my puppy, Helo."



Tenure for Taylor

To nobody's surprise, Amelia Taylor successfully passed her tenure review in 2011, and was awarded tenure by the college. Amelia is an algebraist with broad research interests: she is working on new algebraic approaches to phylogenetics (those tree diagrams showing evolutionary relationships) and is also a key member of an international group of researchers developing software for algebraic research. Amelia is well known at the college for her creative teaching methods, including calculus essays and a linear algebra biathlon/poetry contest. Among her many successful CC courses was last year's calculus and geology FYE course co-taught with Megan Anderson in the Geology Department. Amelia and Megan took their students on extended field trips (to Yellowstone and the Grand Canyon) to collect data, then returned to CC to develop mathematical models, learning calculus in the process. In addition to her mathematical and teaching interests, Amelia is an avid trail runner, mountain biker, and high-altitude baker.

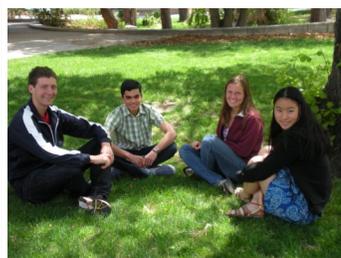


Sabbatical for Stefan

After a successful third year review, Stefan Erickson was on sabbatical in the Fall 2011 semester. He was at the University of Calgary working with Renate Scheidler and Michael Jacobson on a probabilistic approach to calculate class numbers of function fields. This research has potential applications to cryptography and computational number theory. Stefan also worked towards finishing past research projects conducted with former CC students Tra Ho, Samuel Zemedkun, and Charles Morgenstern on hyperelliptic curve arithmetic and Apollonian circle packings. In addition, Stefan prepared for a new course this spring on Cryptography and a half-block course on the Mathematics of Poker. Both classes had long wait lists - no doubt due to Stefan's stellar reputation as a teacher, as well as the intriguing topics.



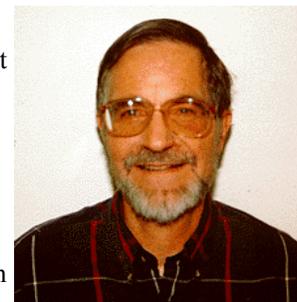
Friends and family gather in front of Dave's domino portrait during Homecoming 2011. A highlight of homecoming was a Fearless Friday talk by Barry Balof ('97). Barry, a professor of mathematics at Whitman College, gave a talk in Dave's honor titled "Fibonacci and Friends: Famous Number Sequences and the Liberal Arts."



The Euclid Scholarships are made possible by donations from generous alumni. If you'd like to help, you may send a check (made payable to "Colorado College" and with "Euclid Scholarship Fund" on the memo line) to: Development Office, The Colorado College, PO Box 1117, Colorado Springs, CO 80901-9897.

DAVE ROEDER—IN MEMORIAM

The department was saddened at the end of last summer by the passing of Dave Roeder, a long-time faculty member. Dave taught at the college from 1970 until 2000, when he retired. Those who were his students no doubt remember him as a gentle person with an extraordinary attention to detail. He loved number theory and actually is the person who introduced and designed our current number theory course in the early 1970's. Soon after, the department voted to make the course part of the major where it currently remains. Dave's interest in numbers spilled over into an interest in baseball statistics; he was an avid fan of the Sky Sox in Colorado Springs and the Rockies up in Denver.



Like most in our department, Dave taught nearly the entire spectrum of courses in our curriculum. Early on, he recognized the importance of computer science and retrained himself so he could nurture the growing interest in computer science among students. Perhaps Dave's biggest contributions to the department occurred during the years 1975-1985 when he served as chair. It was during these years (after the block plan had settled in) that Dave helped reshape the department into one of the most respected on campus. This involved arguing for more faculty and more resources, which he did with his usual extra care. Dave's curiosity and love of mathematics never waned, and his colleagues referred to his incisive questioning after departmental talks as "being Roedered."

Dave is a legend in the department and we chose to remember him at his retirement by commissioning a portrait done in dominoes using a clever algorithm devised by the artist Robert Bosch. The work hangs in the atrium outside the department spaces in the Tutt Science Center. Our seminar room is also named in his honor (as if we could ever forget him). Dave's legacy lives on through the department's commitment to excellent teaching and scholarship, and especially through the spirit of camaraderie that he fostered.

EUCLID SCHOLARS!

Each year, the department awards four Euclid Scholarships to first year students and sophomores who show outstanding promise in mathematics and computer science. Now in its fourth year, the program has proven to be very effective at encouraging talented students to continue their math and CS studies. Here are this year's winners:

Trevor Barron, a first year student from Pittsburgh, PA, is an aspiring CS major who loves to "see how the power of computers can meet human needs and improve quality of life... I especially look forward to opportunities to do advanced work in artificial intelligence and machine learning." In addition to being a stellar student, Trevor is the 2011 National Race Walking Champion, and is training for the 2012 Olympics!

Minqi Liu, a first year student from Hangzhou, China, says that "To me, math is like a language I use, just like English and Chinese. It speaks in a unique way... I am especially looking forward to learning and researching how it speaks in the real world, like in the prediction of the economy..." When she isn't studying math, Minqi enjoys dancing, playing the piano, figure skating, and participating on the debate team.

Denali Molitor, a sophomore from Walla Walla, WA, has decided to major in mathematics. She says: "I thrive on the challenge associated with solving math problems, each problem like a puzzle." Denali will do research this summer at Valparaiso University, using differential equations to model sexually transmitted diseases. She is already planning to pursue a Ph.D. in mathematics after graduating. In the meantime, she enjoys skiing, swimming, and acting as an FYE mentor and tutor at the Quantitative Reasoning Center.

Gautam Webb, a first year student from Golden, CO, is planning to double major in mathematics and physics. He says: "I study math because I love it... Math has an unparalleled ability to amaze me when I see and understand a wonderful mathematical result." Gautam is also passionate about music: "I play the cello, and I am on a mission to learn how to compose."

FEARLESS FRIDAYS

Since the early 1980's, the department has had a weekly seminar/colloquium on Friday afternoons (known to everyone as Fearless Fridays). The speakers are mathematicians and computer scientists from CC and other institutions; most of the talks are about research problems, but at least one talk each block is aimed at students (with pizza provided, of course). Among this year's talks were:

- Evolving Video Game Bots, by Matthew Whitehead (CC)
- Julia Sets and Surfaces, by Beth Schaubroeck (USAFA)
- The Timing of Insect Development and Bark Beetle Outbreaks, by James Powell (Utah State)
- The Field of Origami Numbers, by Mike Siddoway (CC)
- An Independent Axiom System for the Real Numbers, by Greg Oman (UCCS)
- Period Three Implies Chaos, by Andrea Bruder (CC)
- A Celebration of Leap Day, by Marlow Anderson (CC; we had to redefine Feb. 29 as Friday for the purposes of this talk)

The next time you find yourself in the area on a Friday, check the department web page—you never know what you might learn!

SPRING PICNIC



On April 25th, the department held our annual picnic. Students, faculty, and staff enjoyed snacks, games, and the occasional water balloon ambush. Contrary to tradition, it failed to snow (left). In keeping with tradition, Number Theory Horseshoes degenerated into accusations, counter-accusations, and spontaneous re-writing of the rules (right).



SENIOR PROFILES

Graduating math major **Elise Hellwig**, originally from St. Louis, will spend next year working on an organic farm in Bedford, PA. (Elise was very active in the CC student farm.) After that, she plans to go to graduate school to study ecology, focusing on stochastic modeling and building on the research she did for her senior thesis. Why did she choose to major in math? "Because I was interested in mathematical modeling and biology and ecology.... Of course, if you can do math, you can do anything!"

Graduating computer science major **Nick Pascucci** grew up in the Boulder/Longmont area, but was born at Penrose hospital just up the street from CC. Of being a CS major, Nick says; "After the first couple of classes I took, I began to realize that being a computer scientist and a programmer really allows you to have a freedom that few other professions have. You can create your products almost anywhere with little in the way of physical resources...You can make your own tools and improve your own life in the exact same way. It's a liberating field in a lot of ways." Nick put this theory to test in his senior thesis, when he designed and built a small robotic vehicle from scratch—doing everything from fabricating parts on a 3D printer to writing code for recognizing and navigating through doorways. Next year he will be working for Google (which is, apparently, some kind of internet company): "I'm not sure yet what exactly I'll be working on, but I'm sure it will be exciting and difficult! In the long run, I'm planning on starting my own company. I've always been fascinated by robotics..."

Graduating mathematical economics major **Claire Petersen**, from Winnetka, IL, chose her major because "I have always enjoyed a challenge, and I knew that the math-econ major would definitely provide that." She fondly remembers developing mathematical models of tumor growth in her calculus 3 class: "I thought it was pretty cool that I could do that without having any sort of background in cancer research. It helped introduce me to the fascinating world of applied mathematics." Next year, Claire will work for Blue Canyon, a consulting firm in Evanston, IL. What about the future? "I hope to work towards an MBA, and I have aspirations of becoming an entrepreneur and hopefully offering something positive to the world. I would love to work on making innovative green technologies available to people living in developing countries—it's a huge market that is just beginning to be tapped into."

Math and Computer Science Faculty (2011-2012)

Marlow Anderson
David Brown
Andrea Bruder
Stefan Erickson
Steven Janke
Molly Maxwell
Jane McDougall
Mike Siddoway
Amelia Taylor
Fred Tinsley
Matthew Whitehead

Departmental Staff

Marita Beckert (Staff Asst.)
Victoria Curnutte (Paraprof.)
Amy Pacheco (Tech. Dir.)

Graduating Majors, 2012

Mathematics:

*Sakhile Dlamini
Michael Dougan
Michael Goforth
Elise Hellwig
Georgia Ivsin
Desirae Martinez
Rebecca Mitchell
Evan Ranken
Hannah Thompson
Rebecca Thompson*

Computer Science:

*Emily Burton-Boehr
Sakhile Dlamini
Robert Florance
Samuel Johnson
Nicholas Pascucci
Jason Toth*

Mathematical Economics:

*Andrew Baird
Cassandra Benson
Arthur Bidwell
Lee Carter
Christopher Cooke
Kaleb Fergin
Timothy Hall
Christopher Lowenstein
Claire Petersen
Laura Putnam
Rachel Vitale
Mitchell Wiggy*

**The Colorado College Department of
Mathematics and Computer Science**

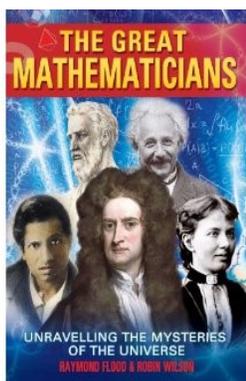
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www.coloradocollege.edu/Dept/MA

ROBIN WILSON

For many years, we have enjoyed regular visits from Dr. Robin Wilson, an eminent British graph theorist and mathematical historian. Robin was here for block 7, teaching a course on “The Mathematics of Music”, collaborating with John Watkins on research in graph theory, giving two Fearless Friday talks, and shamelessly plugging his latest book: [The Great Mathematicians: Unraveling the Mysteries of the Universe](#). It is only \$16.95 on Amazon, and every self-respecting mathematician should have a copy (or two).



COMINGS AND GOINGS

The department has been greatly enriched for many years by the presence of visiting faculty who have shared their talent and passion for teaching mathematics. Molly Maxwell, who has been a wonderful colleague for the past four years, is moving on next fall to a tenure-track position at Flathead Valley Community College in her native Montana. We will be sorry to see her go, but we are excited for her to take the next step in her career. We will be welcoming a new full-time visiting professor next year: Beth Malm-skog. Beth comes to us from a visiting faculty position at Wesleyan University. She received her Ph.D. in 2011 at Colorado State University; her research is in arithmetic geometry, number theory, and cryptography. Beth is an avid hiker, cross-country skier, and radio DJ. Check out her fun math puzzle blog at: <http://malmskog.wordpress.com/>

Each year, a lot of the heavy lifting in the department is done by our paraprofessional, a recent graduate who acts as a teaching assistant, social coordinator, and general resource for students. Victoria Curnutte (CC '11 in mathematics) has done a wonderful job for us this year. Originally from Castle Rock, CO, Victoria signed on to be our paraprof because “I always loved being part of the math/CS department as a student, and I wanted to help contribute to the environment that encouraged my mathematical enthusiasm.” Of her experiences this year, she says: “The highlights were definitely the moments when students and I worked together to understand difficult concepts.” She fondly remembers a group of calculus students who were in her office every morning for a block, then baked her cookies as thanks. Next year Victoria will work for the Schuler Scholarship Foundation in Chicago, which helps low-income high school students prepare for selective liberal arts colleges. In the longer term, she plans to teach mathematics at either the high school or college level. Next year’s paraprof will be Evan Ranken (CC '12 in math and physics), who was hired on the condition that he give us due credit should he ever win a Nobel Prize or Fields Medal.

UNDERGRADUATE MATH CONFERENCE

On February 25, CC hosted the 9th annual Pikes Peak Regional Undergraduate Mathematics Conference (PPRUMC). There were over 100 faculty and student attendees, from all over Colorado as well as Kansas and South Dakota. The day’s activities included a keynote address by Dr. Loren Cobb of U.C. Denver (who gave an inspiring talk on “Nation Building with Mathematics”), a career panel, and talks by student researchers. Among the latter were four CC students: Elise Hellwig (“Metapopulation Modeling and Analysis with Demographic Stochasticity”), Rebecca Mitchell (“The Restricted 3-Body Problem: Reducing Energy Expenditure of Space Missions”), Evan Ranken (“Differential Geometry, General Relativity, and the Big Bang”), and Rebecca Thompson (“Omega Graphs: Radio Labeling”). Funded by generous grants from the Office of the Dean and from the Mathematical Association of America, the conference also featured a pizza-and-games social mixer hosted by our students. The conference rotates among four hosting institutions (CC, UCCS, USAFA, and CSU-Pueblo), and provides a great opportunity for up-and-coming mathematicians to meet each other and share their love for mathematical discovery.

PUTNAM AND MCM CONTESTS

Five Colorado College students took the 2011 William Lowell Putnam Mathematical Exam in December 2011. When the eraser dust cleared, the team finished 97th in North America, and CC’s top finisher, senior Evan Ranken, made it into the top 18% for individuals. A solid performance by the other participants (Ravi Donepudi, Cory Scott, Rebecca Mitchell, Gautam Webb, and Eddie Figueroa) lifted the team to its “Top 100” ranking. The Putnam Exam consists of 12 challenging problems and is taken over 6 hours on the first Saturday of December. The exam was particularly difficult this year, only one competitor out of 4440 scored above 75%. Two of the problems were successfully solved by only one person and a third problem did not earn even a single point of credit among all of the participants. CC was strongly represented this year and a formidable core will return next year for the 2012 exam.

Every year in February, undergraduate students from all over the world wrestle with one of two open-ended, real-world math problems in the Mathematical Contest in Modeling (MCM). This year, three CC teams of three students each competed. Elise Hellwig, Denali Molitor, and Eli Williams formed one team, Lee Carter, Claire Petersen, and Mitchell Wiggy worked together, and the third team was Rebecca Mitchell, Aradhya Sood, and Linnet Vacha. The students are all mathematics and mathematical economics majors, and for Elise and Rebecca this was their second time competing. Lee, Claire, Rebecca, Aradhya, and Linnet were part of Amelia Taylor and Andrea Bruder’s Mathematical Modeling adjunct class in the fall of 2011, which helped prepare the students for the challenging contest. All three teams chose a problem requiring them to optimize the assignment of camp sites along the Big Long River. The teams submitted their solution to the Consortium for Mathematics and Its Applications (COMAP) after only four days. 5026 international teams submitted solution papers, and all CC teams were successful participants. Congratulations!!