

COUNTABLE BITS

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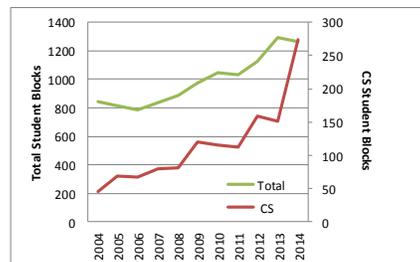
Student Awards

Each year the department gives the **Florian Cajori Award** in Mathematics and Computer Science, honoring a student who has demonstrated unusual talent and achievement and also demonstrated a breadth and depth of interest in math or computer science. This year's honoree is **Gautam Webb**, who graduated with distinction in mathematics. Continuing a recent trend with Cajori winners, Gautam will stay on with us next year as a paraprofessional.

In addition, the department honors a graduating student or students with the **Sophie Germain Award**, which recognizes unusual dedication and passion for mathematics or computer science. This year's award goes to two mathematics majors, **Joe Howard** and **Katy Martinez**. Joe is preparing to embark on a career as a high school math teacher (lucky students!), while Katy is headed to Colorado School of Mines to pursue a PhD in applied math.

Enrollment Growth

These are exciting times in the Department of Mathematics and Computer Science. As you will see in this newsletter, there is a lot going on! One of the most striking developments in recent years has been the rapid increase in enrollment in our math and CS courses. Over the past ten years, total enrollment in our courses has gone up by about 50%. In computer science, the increase has been even more dramatic: over a 5-fold increase in the past decade! There are, no doubt, a number of local and national factors at play here: the department's great reputation, a shift toward scientific fields during times of economic uncertainty, and the growing use of mathematics and computer science in other disciplines. Indeed, much of our growth has come from students majoring in other areas of the natural and social sciences who are taking courses like linear algebra, differential equations, and probability. A course or two in computer science is now considered by many disciplines to be just as important as a course in calculus or statistics. We are still getting used to high enrollment in upper-level classes (wait lists for partial differential equations and theory of algorithms?!), but it is great fun to be teaching so many bright and interesting students.



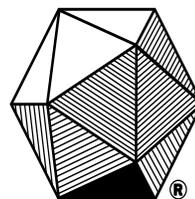
Molly Moran's Triumphant Return



A nice side-effect of our high enrollment is that we get to hire top-flight visiting faculty to help with the teaching and advising. In 2015-16, both **Rodney James** and **Michael Penn** will be returning for their third year, and they will be joined by **Molly Moran**. Molly graduated from CC in 2009 as a math major (and French minor). She has just completed her PhD at the University of Wisconsin-Milwaukee, working with Craig Guilbault in the area of geometric group theory - a mix of algebra and topology. Molly has already established herself as a superb teacher and researcher, and we couldn't be happier to have her join the department as a faculty member. Fred Tinsley is especially excited to have a fellow topologist in the department!

MAA Section Meeting

The department celebrated the 100th anniversary of the Mathematical Association of America by hosting the Rocky Mountain Section Meeting on April 17 and 18, 2015. The meeting featured two days of talks, with over 150 attendees. CC's own professor Florian Cajori (see p. 4) was instrumental in founding the MAA in 1915, and he served as one of the organization's first presidents. It was only appropriate that during the meeting we celebrated his memory by naming a classroom in Palmer after him (ribbon-cutting pictured below). **David Brown** and Jim Powell (Utah St. Univ.) conducted a pre-meeting workshop on model-fitting in math classes. **Steven Janke** gave a talk on Cajori, and graduating senior **Katy Martinez** gave a talk on her thesis work—a mathematical model for bullying. Recent CC graduate **Charles Morgenstern** also gave a talk related to his current PhD work at Colorado School of Mines. Nationally known speakers Bill Dunham and Karen Saxe gave well-received plenary lectures. The program co-chairs for the meeting, **Andrea Bruder** and **Marlow Anderson**, did a stellar job.



MAA

MATHEMATICAL ASSOCIATION OF AMERICA

*Math and Computer Science
Faculty (2014-2015)*

Marlow Anderson
David Brown
Andrea Bruder
Stefan Erickson
Rodney James
Steven Janke
Jane McDougall
Michael Penn
Mike Siddoway (Assoc. Dean)
Amelia Taylor
Fred Tinsley
Matthew Whitehead
Benjamin Ylvisaker

Departmental Staff

Marita Beckert (Staff Asst.)
Colter Fatt (Paraprof.)
Denali Molitor (Paraprof.)
Amy Pacheco (Tech. Dir.)
Logan (Pacheco) Pray (Baby)
Mia Whitehead (Backup Baby)

Mia Whitehead,
prospective
student



Rawles Exam

Our department's annual math contest, the Rawles exam, was held in Block 6. Our *upper division winner* was **Paul-miki Akpablie**, and our *lower division winner* was **David Bai**.

The **Goldwater Scholarship** is considered by many to be the top nationwide scholarship for undergraduate students pursuing a career in scientific research. **Melissa Jay**, a junior math major who features elsewhere on this page, was named a Goldwater Scholar by the Barry Goldwater Scholarship and Excellence in Education Program. Congratulations!

#WINNING

Our students did it—again! A team of three CC students (**Eleanore Campbell, Melissa Jay, and Nate Mankovich**, pictured) wrote one of 10 Outstanding Winning Papers in the 2015 Mathematical Contest in Modeling. A total of 7636 solution papers were submitted by teams from 17 countries. In 2014, a CC team that included Melissa received the Finalist Winner designation. This year, Melissa, Ellie, and Nate also received the INFORMS Award. INFORMS is the largest society in the world for professionals in the field of operations research, management science, and analytics, and they select a winning paper that best exemplifies the standards of those professions. This year, contestants chose between two timely problems: “Searching for a Lost Airplane”, and “Eradicating Ebola”. Ellie, Melissa, and Nate developed a search algorithm for a lost airplane feared to have crashed in open water on a transoceanic flight. They had to assume that there are no signals from the crashed plane and take into account that there are many types of airplanes. **Andrea Bruder** acted as the team's advisor, preparing them during the fall semester—she couldn't be prouder!



Two other CC teams (**Nelson Ding, Alice Xiang, Zhiyao Zhu, and Ganesh Karapakula**) participated in the contest and chose to model an Ebola outbreak when an effective vaccine or drug is available. They had to consider the spread of the disease, the quantity of the medicine needed, possible feasible delivery systems, locations of delivery, and the speed of manufacturing of the vaccine or drug. The contest took place on Feb. 5-9, and teams of up to three students worked on one of the two open-ended modeling problems. They did all the modeling, numerical simulations, and writing in only four days! (Of course, on the Block Plan that's about a month, so it isn't really fair to teams from other schools!)

The 75th Annual William Lowell Putnam Mathematical Competition took place on December 6, 2014. This famous contest is a devilishly difficult six-hour exam with over 4000 undergraduate contestants from the United States and Canada. The median score on the exam is zero! Colorado College had nine participants this year, of whom five scored points. Two of our students, senior **Gautam Webb** and junior **Ganesh Karapakula** placed in the top 25% of all contestants. Congratulations to all of our participants and their advisor, **Michael Penn**.

DOUBLE PARAPROF POWER!

Paraprofessionals are an indispensable part of our department. Recent CC graduates, they spend a year acting as teaching assistants, mentors, and event organizers. For the first time this year, we had two full-time paraprofs: **Denali Molitor** ('14, mathematics) and **Colter Fatt** ('14, computer science). Denali reflects on the past year: “I had a blast working closely with CC students, staff, and faculty this year. Some highlights include a trip to the Baca Campus with the mathematics First-Year-Experience class, and having lots of students packed into my office. At the end of the school year, I will be leaving for an even drier and sunnier part of the country, as I will begin the mathematics Ph.D. program at UCLA this fall. I am forever grateful for the welcoming and supportive nature of the math and CS department at Colorado College, as well as for all of the advice and guidance that I received from faculty.” Colter adds: “As with many CC students, I originally came here with the goals to grow, learn, and have an adventure. Staying on one more year let me do even more. I had the chance to interact with professors on a new level, and sit in on classes that were not offered when I was a student. I enjoyed teaching students new concepts and helping them solve their programming problems. I am currently planning on moving to Seattle and getting a job in the start-up industry. I'm looking for a place with a similar environment to that which I encountered at CC.”

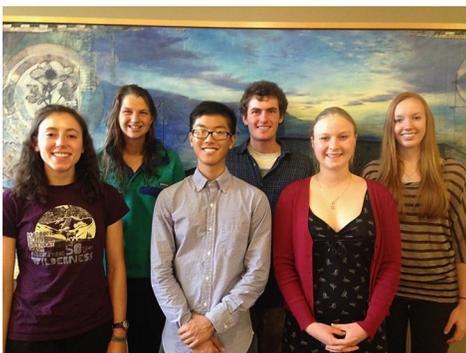
Paul-Miki's Big Idea



The ingenuity and creativity of our students seems not to have an upper bound. Junior math and biochemistry double major **Paul-miki Akpablie** led a team that won CC's 2015 Big Idea Award. They received \$25,000 to help fund Kadi Energy, their startup company that is developing a solar-powered phone charger aimed at customers in developing countries, including Paul-miki's home of Ghana. Another team in the running was led by mathematical economics major **Anubrat Prasai** and CS major **Soeren Walls**. For more information about this exciting competition, check out: <http://www.coloradocollege.edu/other/bigidea/>

EUCLID SCHOLARS!

Each year, the department awards several Euclid Scholarships to rising sophomores and juniors who have demonstrated outstanding potential in mathematics or computer science. The program was begun in 2009, funded by a generous gift from **John Tompkins** ('89). Since then, additional gifts from alumni and friends of the department have allowed the program to expand, and this year we were able to award six \$2000 scholarships. The Euclid Scholarship program has become a vital part of our program, helping us to recruit and retain some truly outstanding students. Indeed, many of the accomplishments noted in this newsletter are by previous Euclid Scholarship recipients. The department's faculty are deeply grateful to the donors whose generosity has made this program possible.



2015-16 Euclid Scholars (L-R): Natalia Dellavalle, Robin Fossett-Carmen, David Bai, Nick Crews, Bara Hanzalova, Rebecca Watson

The 2015-16 Euclid Scholars are a talented group with broad interests. **Robin Fossett-Carmen**, a sophomore from Minneapolis, is an art studio major who is planning to also major or minor in math. She writes that "The exhilaration of completing a difficult problem or the unforeseen realization of a topic clicking into place makes the hard work and challenge all the more worthwhile." **David Bai**, a first-year student, is drawn to mathematics and computer science because of their beauty and usefulness: "Mathematics has always been about solving problems for me...the utility and practicality is what draws me." **Nick Crews**, another first-year student, has also found both math and computer science to be invigorating. He reports that a highlight of the past year was figuring out how to develop navigational sensors for his robotics class. **Barbora Hanzalova** is a sophomore who loves applied math and computer science; she is planning to pursue a career in engineering, building on her experience last summer

working in Bolivia with Engineers Without Borders. **Rebecca Watson** is also a sophomore interested in engineering. She says: "The more math and computer science classes I take, the more I love it."

Natalia Dellavalle, a first-year student from Denver, is planning to major in mathematics, then go to graduate school in math or economics. Natalia wrote that "Upon understanding a math problem, I feel more connected to the universe and appreciative of my place in this complex and ever-evolving world." Who could put it better than that?

ALUMNI NEWS AND NOTES

What can you do with a degree in mathematics or computer science? Well, let's check in with some recent graduates... **Sarah Tolman** ('10) is a data scientist working at Facebook, while **Jessa Karlberg** ('13) is a senior programmer analyst at Lexidyne LLC, and **Kate McManus** ('13) is an information design specialist at Stroz Friedberg. **Amy Hepner** ('11) just completed her masters degree in statistics at Ohio State University, where **Andrew Bean** ('09) is working on his PhD in statistics. Not to be outdone, **Casey Rommel** ('10) is a graduate student in medical informatics at the University of Utah, while **Benjamin Rogers** ('10) is pursuing a PhD in biostatistics at UCLA. **Angela Campbell** ('07) is an associate specializing in intellectual property litigation at Cooley LLP, and **Trinity Ludwig** ('06) is an executive VP at Sage Canyon Advisors. **Jette Henderson** ('08, nee **Peterson**) is a data mining expert at Applied Research Laboratories at the University of Texas, and **Briana Sallee** ('13) is an engineering technician at American Energy Partners. **Linnet Vacha** ('13) is a data and policy analyst at Acumen LLC. **Courtney Gibbons** ('06) is an assistant professor of mathematics at Hamilton College, where she just received the John R Hatch Excellence in Teaching Award. **Lauren Hinkle** ('11) is pursuing a PhD in computer science at the University of Michigan, and **Joel Ross** ('06) is a visiting professor of computer science at the University of Puget Sound. **Yulan Qing** ('06) is a postdoctoral researcher in mathematics at Technion University in Israel. **Sarah Wolff** ('10) finished her PhD in mathematics at Dartmouth and will begin teaching at Denison University. **Jess Coyle** ('08), **Elise Hellwig** ('11), and **Lauren Shoemaker** ('11) are all pursuing PhDs in ecology (at North Carolina, UC Davis, and CU Boulder, respectively). And that just scratches the surface! We'd love to hear from any and all alumni about their post-CC adventures.

PHI BETA KAPPA INDUCTEES

Each year, a select group of graduating seniors are invited to join Phi Beta Kappa, the prestigious national honor society. In 2015, the math and computer science department can claim a whopping six out of the thirty-four newly elected members at CC: **Emma Holmes**, **Minqi Liu**, and **Katy Martinez** (math); **Trevor Barron** and **Jason Mushinski** (computer science); **Katerina Sukdolakova** (mathematical economics). Did we mention that our students are amazing?

The *Euclid Scholarships* are made possible by donations from generous friends and 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

Graduating Majors, 2015:

Mathematics:

*Maggie Bailey
Jenna Griffith
Emma Holmes
Joe Howard
Fanpei Liu
Minqi Liu
Connor O'Brien
Katy Martinez
Julia Napolitano
Nicole Pey
Kelsey Smith
Sam Spellman
Emily Stearns
Cholpon Tuzabaeva
Chris van Dusen
Gautam Webb
Katherine Wilkinson*

Computer Science:

*Lucas Bowyer
Lou Brand
Christina Cuneo
Evan Mega
Jason Mushinski
Walker Pollard
Raylon Silberman*

Mathematical Economics:

*Richard Boebel
Sandford Brown
Garrett Cry
John Dimmit
Andrew Grosenbaugh
Julia Lawton
Sidharth Moktan
Christine Odegi
William Richmond
Nompendulo Shongwe
Brendan Smith
Katerina Sukdolakova
Andrew Visich
Heidi Yim
Rebecca Zhang*

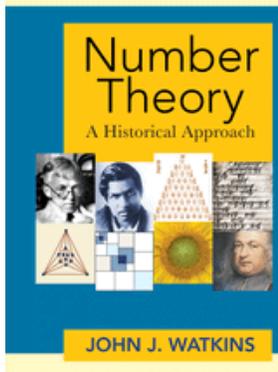
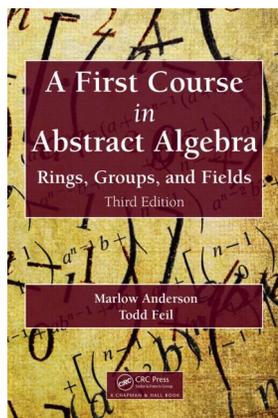
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Faculty scholarship remains a high priority at CC. In addition to numerous research articles and conference presentations, faculty in the department have several book projects under way or recently completed. These include a new edition of Marlow Anderson's textbook on abstract algebra and John Watkins's new book on number theory. John is also working with Andrea Bruder on an English translation of Beutelspacher's book: *Numbers: Histories, Mysteries, Theories*.



FEARLESS FRIDAYS

Each Friday afternoon during blocks, the department hosts a colloquium series known as Fearless Fridays. Each week features a talk on some area of mathematics or computer science, given either by one of our own faculty or a guest speaker (and rated G – XXX depending on the mathematical content). Some talks are aimed at a student audience, while some are aimed at faculty; in both cases they help nurture our culture of inquiry and exploration. Among the highlights this year: **Sarah Wolff** ('10) gave a talk during homecoming about the algebra of card shuffling, and **Molly Moran** ('09) spoke about her research in topology. **Kathy Merrill** (professor emerita) presented her ongoing research on wavelets, and our own **Marlow Anderson, David Brown, Andrew Glen, Rodney James, Steven Janke, Amelia Taylor, Fred Tinsley, and Ben Ylvisaker** all gave talks on topics ranging from computer graphics to maximum likelihood estimation and phylogenetic inference. We also enjoyed visits from Gonzalo Aranda Pino (Univ. de Malaga, Spain), Edward Chow (UCCS), Michelle Ghrist (USAFA), Andrew Linshaw (DU), Chris Sadowski (Ursinus), and Kristen Walcott-Justice (UCCS). Math and computer science majors are required to write up summaries of four talks before they graduate, and we recognize a graduating senior who turns in the best set of write-ups. This year's winner of the "Fearless Award" was **Emily Stearns**. Congratulations! (If you find yourself in the area on a Friday afternoon, don't hesitate to drop by and learn something interesting. And if you would like to give a talk, please get in touch!)

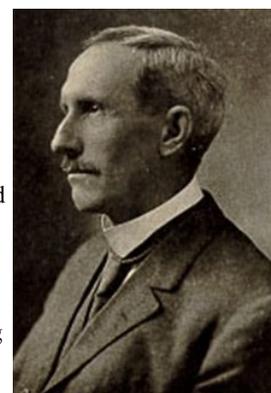


BLOCK VISITORS

The continued success of our department is due in no small part to the contributions of wonderful block visitors. They allow us to offer enough sections of needed courses, teach topics that we wouldn't otherwise be able to offer, and inject new ideas and insights into our discussions. Next year promises to be an especially exciting one for block visitors. Among the highlights: **John Watkins** (professor emeritus) will teach a course on graph theory. **Andrew Glen** (West Point, retired) will teach statistics, calculus, computer science, and probability (show off!). **Glen van Brummelen** (Quest University) will teach a course on spherical geometry, while **Robin Wilson** (Open University, UK) will teach our course on the history of mathematics. Glen and Robin are among the world's foremost experts on these fields, respectively. Finally, **Richard Koo** (CC '83) will co-teach with **Ben Ylvisaker** a new course on software engineering. Richard earned his Ph.D. in computer science from Columbia, and has helped develop several Silicon Valley startups. His practical experience and liberal arts background will make this course a unique opportunity for our students. The Block Plan gives us the ability to bring in world-class talent and enhance our curriculum in wonderful ways.

WHO WAS CAJORI?

Florian Cajori was one of the most distinguished members of the CC faculty, helping to shape the mathematical and natural science programs during the college's early years. In 1889, tuberculosis forced him to move from Tulane University to the dry climate of Colorado Springs, where he began teaching at CC. For ten years he was professor of physics and for 20 more he was head professor of mathematics. Soon after Roentgen discovered x-rays (1895), Cajori was the first west of the Mississippi to reproduce the results by x-raying his colleague's foot and hand; the images are still in the special collection area of the Tutt library. Cajori was an eminent historian of mathematics, and he began publishing his many books (about 13) immediately after arriving at the college. His *History of Mathematics* (1894) secured his reputation on the national and international stage and is still read today. While working tirelessly on his academic writing, he was also a strong supporter of teaching at all levels. He was one of the founders of the Colorado Science Teachers organization as well as the Mathematical Association of America. In 1918, Cajori accepted an offer from the University of California at Berkeley for a position as chair in the history of mathematics (the first such chair in the world). *The Tiger* noted that the decision was the "greatest blow that has ever come to the student body".



Cajori's legacy resonates in the strong traditions of research and teaching in the department today, and especially in the historical perspective that informs much of what we teach. Recently, the department was pleased to receive several of Cajori's books donated by the family of his grandson. We have incorporated them in our collection as well as in Tutt Library's special collection. For more on Florian Cajori, visit: <http://www2.coloradocollege.edu/dept/MA/history/Faculty/Cajori.html>