Math News at Bates

2011–2012

The winning t-shirt design

$$1 + 1 = O$$

WHeN YoU'Re IN Z_2

Bates MatHeMatics

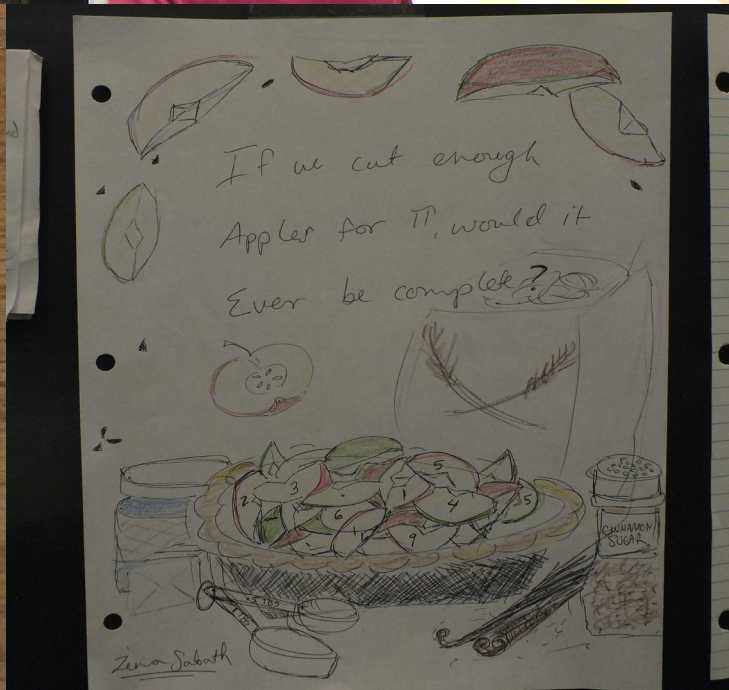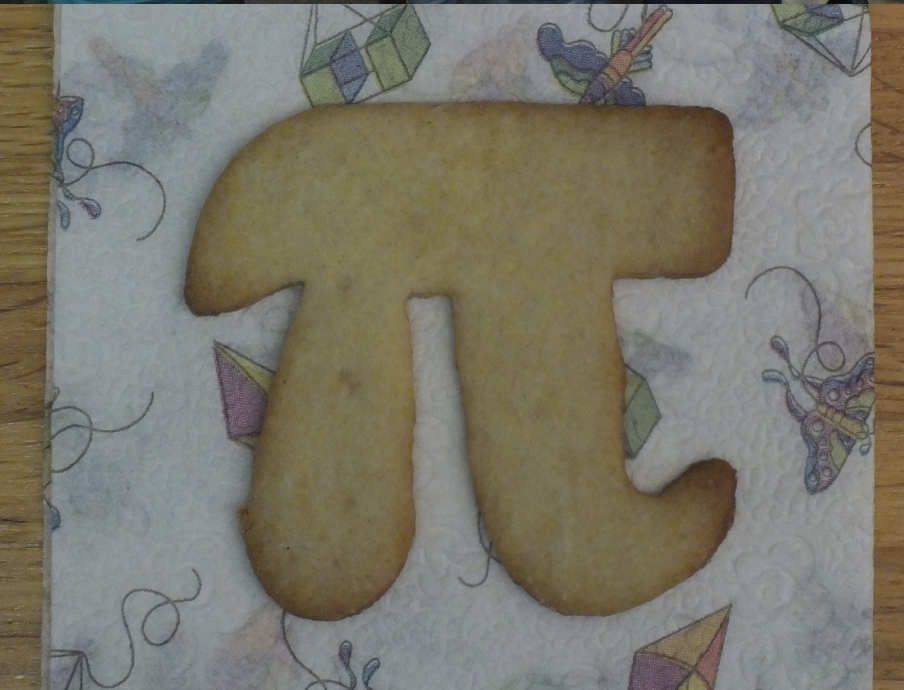## The Math Council Events for 2011–2012

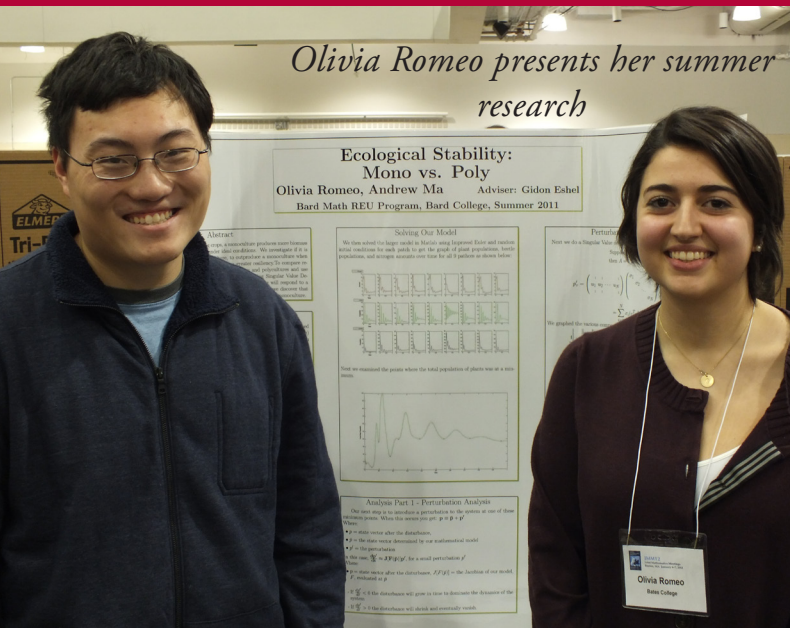|	
October 14	Doing origami, watching *Between the Folds*, and eating pizza
November 7	Ice cream social and chance to talk about winter courses and registration
November 16	Designs due for our first annual Math T-shirt Design Contest
December 2	Pre-Putnam Pasta Party, getting ready for the Putnam Exam
February 16	Capstone Information Session: deciding about thesis or seminar
March 14	Pi Day (of course!) social event
March 27	Mathematical Induction Ceremony, welcoming newly declared majors

Chip Ross talks about the senior seminar he will offer next year, as part of our event to help rising seniors decide: seminar or thesis?

If we cut enough Apples for π, would it Ever be complete?

Bates at the Joint Mathematics Meetings, January 2012

Olivia Romeo presents her summer research

Ecological Stability:
Mono vs. Poly

Olivia Romeo, Andrew Ma   Adviser: Gidon Eshel

Bard Math REU Program, Bard College, Summer 2011

Mathematics faculty

Sonia Kovalevsky High School Math Day at Bates College

Bates College's 2012 Sonia Kovalevsky High School Math Day was a success! As planned, the day brought together a diverse community of women from Androscoggin County to learn, socialize, and celebrate mathematics. The activities, speakers, and students brought great energy to campus and hopefully some of that energy was returned to the local high schools.

We had 21 students, 3 teachers, 8 assistants, and 4 speakers at the event as well as a few visitors from the Bates College community. The three activities ("How to Rig an Election", "Learning Mathematics through Games" and "Dance and the Dihedral Group") kept students active and involved through the day. Dr. Amanda Criner gave an interactive talk, "Mathematics: Integrated, Hot, and For Everyone" which touched on why everyone (no matter your career aspirations) should take more math courses and seek out mentors early. Also, she explored examples of integration of mathematics into the sciences and industries. A great lunch and a Bates campus tour were also highlights for these young women.

The event was sponsored by the National Science Foundation, the Association for Women in Mathematics, the Harward Center for Community Partnerships, and the Bates College Mathematics Department.

contributed by Catherine Buell

Math Department Colloquia

This year's colloquium series highlighted teaching: what do we do in the classroom? What are themes that run throughout mathematics courses? What are ideas one person has tried, that others might like to hear about?

October 4   Adriana Salerno, about clickers in the classroom

October 25   Chip Ross, about his senior seminar in Chaotic Dynamical Systems

November 8   Jonathan Webster, about translating original sources with Tim Molnar '11

November 29   Meredith Greer, about Bates Senior Seminars across the years

January 24   Grace Coulombe, about the Bates Summer Scholars Program

February 7   Bonnie Shulman, about her course Mathematics for a Just World

March 14   Meredith Greer, about her course Mathematics Across the Sciences

Sampson Lecture

September 22   WASHINGTON MIO OF FLORIDA STATE UNIVERSITY
                         Afternoon talk: Analysis of shape variation and applications to neuroimaging
                         Evening talk: The mathematics of shape in computer vision, biology, medical
                         imaging, and more. *(for more on the Bates website)*

CBB Seminars

November 11   MANNY REYES OF BOWDOIN COLLEGE SPEAKS AT COLBY COLLEGE
                         What does quantum physics say about "points" in noncommutative geometry?

April 20   ANDREAS MALMENDIER OF COLBY COLLEGE SPEAKS AT BATES COLLEGE
                         Gauge theory in four dimensions and mock modular forms

# Additional Talks

October 28   BEN FINE, OF FAIRFIELD UNIVERSITY AND CAISS, CUNY
                         On surface groups: Motivating examples from combinatorial group theory
                         Sponsored by the Mellon Collaborative Grant

November 2   TOMOKO KITAGAWA OF HARVARD UNIVERSITY
                         The pictorial consciousness in the Japanese mathematical arts
                         Sponsored by Bates Mathematics, East Asian Studies, and History

January 13   BENJAMIN WEISS OF TECHNION, THE ISRAEL INSTITUTE OF TECHNOLOGY
                         Arithmetic dynamics and Sarkovskii's theorem

The Elliptic Curve Cryptography seminar in an interpretive photograph on the Hathorn steps

Senior Theses and Seminars 2011–2012
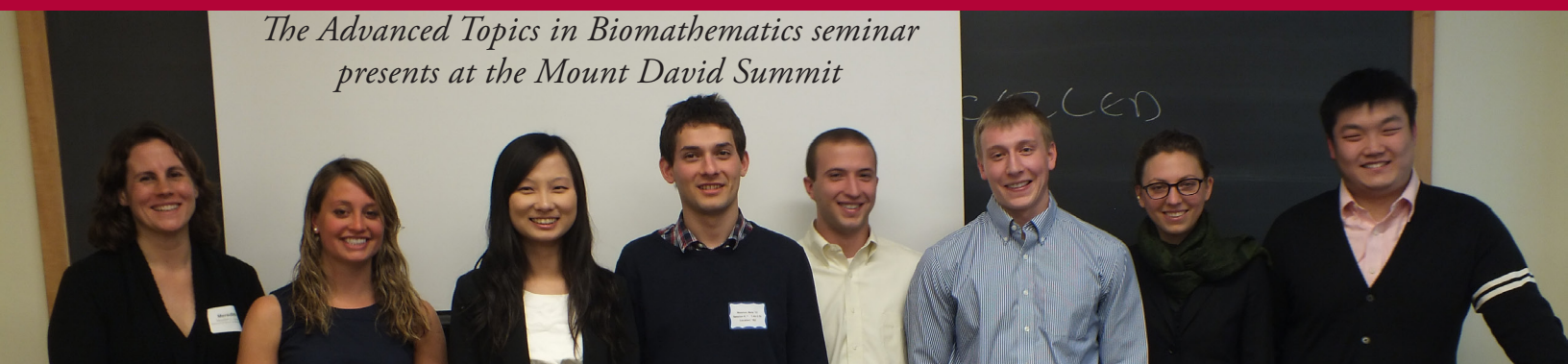
The Advanced Topics in Biomathematics seminar presents at the Mount David Summit

Thesis Writers and Titles

Arjada Bardhi: The analysis behind Bellman's Principle of Optimality in dynamic optimization

Joseph Ekpenyong: Squarefree factorization and its applications to RSA cryptography

Sophie Leonard: A mathematical examination for modeling the pelagic phase of *Gloeotrichia echinulata*

Shannon Walsh: How often can we lose blood? An age-structured, discrete model of erythropoiesis following blood loss

Kathryn Wolf: A mathematical model of the fall 2009 H1N1 pandemic at Bates College

Kathryn Wolf presents her thesis poster to evaluators Peter Wong and Adriana Salerno

Barlow Grant Report

In Fall Semester 2011, I participated in the Bates Fall Semester Abroad in Nantes, France. During the semester, I took a History course, an Identity course, and French. Doing something different from my major, Mathematics, was a unique opportunity to extend my knowledge. The courses that I took improved my critical thinking and my analytical skills. Mathematics essentially is a language of symbols, so taking these courses absolutely enriched my academic experience. Nevertheless, I love Math and the idea of not doing it for a semester seemed scary. As a result, I used the Barlow Fellowship Grant to link my study on and off-campus and to directly relate my abroad experience to my major.

Thanks to the grant I was able to visit Italy. I went to Museo Galileo in Florence, which has fifteen exhibitions relating Math, science and education; and to Museo Nazionale della Scienza e della Tecnologia "Leonardo da Vinci" in Milan, which is the largest national museum in Italy and has objects, machinery, and evidence that retrace the key phases of scientific and technological evolution. I was also able to visit Paris, and it was in this magnificent city where I found a unique exposition. In October, the Fondation Cartier pour l'art contemporain presented "Mathematics: A Beautiful Elsewhere," an exhibition developed with the Institut des Hautes Études Scientifiques and under the patronage of UNESCO. In this exhibition, mathematicians, artists, and visitors like me had the opportunity to see, hear, do, think, and interpret Mathematics.

Mathematicians representing a wide range of geographical and mathematical backgrounds worked together with several artists to transform and combine the aesthetic, scientific and educational aspects of Mathematics into a tangible experience. As someone who loves Math, the exhibition took me through a journey into the heart of mathematical thought; from pure to applied, from the discipline itself to the people who make it. The exhibition embraced Mathematics in all its mystery and strangeness. The ground level of the Fondation Cartier is divided into two areas "The Library of Mysteries" and "The Room of Four Mysteries." In the latter room, there was a ghostly hand of a physicist tracing glowing lines on the wall called Feynman diagrams, which are a symbolic representation of how the universe works on the smallest scales. These images are intercut with videos about the experiments at the Large Hadron Collider in CERN, Geneva. Admiring the diversity of mathematics and, in particular, its contribution to the most advanced areas of scientific research was like seeing the mathematical word made flesh. In the second room, a library in the shape of a zero provided a retrospective of the major events in the history of mathematics. From Archimedes to Poincaré and from Descartes to Einstein, texts with words showed the evolution of human mathematical thought and its delicate relationship with the physical world.

The exhibition "Mathematics: A Beautiful Elsewhere" convinced me that Mathematics is everywhere, from the finite boundaries of material reality to the infinite vastness of conceptual universes. It embraces both the real world and the world of ideas. In the last room of the exhibition, a gleaming shape stood alone in an empty space, a pseudo-sphere tapering to an infinitely fine point. With this shape, artist Sugimoto asked the inevitable question at the heart of the project: how can mathematical abstraction be represented? By visiting a place where Mathematics is out of the milieu in which it is usually articulated, I had the chance to experience mathematical beauty through a geometrical, algebraic, technological, and artistic mosaic.

With globalization, it has become imperative to know and to communicate with people around the world about many subjects and through different lenses. The Barlow Fellowship Grant not only allowed me to do this in Italy and Paris, but it also enhanced my academic goals and views. Visiting the museums, the exhibition and learning about math history, opened my eyes to new scenarios and frontiers of scientific and technological research. The educational activities that I did with the Barlow Grant made me love more Math, science, and education. Moreover, they developed my interest in technology and Math applications.

contributed by Daniela Velasco '13

End-of-year Celebration for our Seniors

Congrats! Grad