

# Sonia Kovalevsky Day

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## Introduction

Imagine living in the mid 1800s and after graduating from high school you are not able to go to college and study what you want. One woman, Sonia Kovalevsky, faced this obstacle in her struggle to pursue and complete a doctoral degree in mathematics. Her fight to become the first woman to achieve this goal opened the doors to universities for other women. Since 1985, select universities have organized and hosted a Sonia Kovalevsky Mathematics Day, for the purpose of encouraging female students from area high schools to study, and consider careers, in mathematics and related fields. This annual event, held in recognition of her achievements, is promoted with the support of the Association for Women in Mathematics (AWM).

Auburn University at Montgomery (AUM) has organized and hosted this event with the support of the AWM. Motivated by the success of this event, the authors have written this paper with the objectives of giving a synopsis of Sonia Kovalevsky's life and contributions; familiarizing the readers with the format of AUM's Sonia Kovalevsky Day; and sharing, with those who may be interested in hosting a similar event, all that is involved in organizing and hosting the event, and the avenues for financial support that may be open.

## Sonia Kovalevsky, Her Life and Contributions

Sophia Kovalevskaya (also known as Sonia Kovalevsky) was born in 1850 into an aristocratic Russian family. Sonia's interest in mathematics began early in her life. As the story goes, when Sonia

was a child, one of the walls in the house was covered with notes from one of her father's mathematics courses. From that point, her interest in mathematics grew. After high school, however, she found pursuing a higher education in mathematics difficult, since Russian universities were closed to women. In 1868 she entered into a marriage of convenience, which provided her the opportunity to travel and study abroad in such places as Saint Petersburg and Heidelberg. In 1870, Sonia went to the University of Berlin where she began studying under the notable mathematician, Karl Weierstrass. For the next four years she studied privately and wrote four papers, the most important one on Partial Differential Equations. After Weierstrass presented the papers to the University of Göttingen in July 1874, Sonia became the first woman to receive a Ph.D. in mathematics.

Sonia and her husband returned to Russia having been unable to find employment. During this period Sonia was invited by the great, Russian mathematician Chebyshev to speak at a scientific conference in St. Petersburg. After Sonia's lecture, the Swedish Mathematician Gösta Mittag-Leffler offered her an academic position at the University of Stockholm. In 1883, she assumed the teaching position for a probationary year; but she did so (that first year) without pay and with no official university affiliation because of her gender. She lectured on such subjects as partial differential equations and higher analysis. Sonia would later win the prestigious Prix Bordin of the French Academy of Sciences in 1888 for her paper On the Problem of the Rotation of a Solid Body about a Fixed Point. She was also a gifted novelist, and wrote *Memories of Childhood* and *The Nihilist Girl*. Unfortunately, Sonia developed pneumonia while traveling and died on February 10, 1891 at the age of 40. She was buried in Stockholm. This incredible woman left a legacy of mathematical and literary works behind, but should be remembered most for opening the doors for other women to be able to freely pursue a higher education.

### Organizing and Hosting the Event: "SK Day" at AUM

The Mathematics Department at AUM was presented with the idea of hosting an SK Day at their university by their new department head, Tuval Foguel. Acting on this suggestion, one of the authors, Dr. Joan Powell, undertook the task of organizing the event, and with encouragement and input from her department head, successfully hosted the first SK Day on March 13, 2004. The event was extremely well supported both financially and logistically.

"SK Day" (sometimes referred to as "SKY Day" in the department at AUM because of the Russian pronunciation of Sonia

Kovalevsky) requires the long-term concerted efforts of at least a couple of very dedicated organizers, planning ahead to bring this event together. The initial deadline for AWM grants is very early August for events in Fall or Spring semesters. The support of administrators cannot be underestimated. We are fortunate that our department head has been an integral part of this event, that AUM places a strong emphasis on community outreach, and that our vice-chancellor was impressed enough with the potential impact of the event to give significant financial support. We decided in our first year to target only surrounding counties with mass mail-outs to counselors/math supervisors at all schools. We increased this base from a scholarship list and in both years advertised through the Alabama Council of Teachers of Mathematics (ACTM) newsletter and the Fall Forum. We attribute 10% - 15% of our attendance each year to the ACTM advertisement statewide and the other 85%-90% of our attendance to the mail-outs.

The format AUM's Sonia Kovalevsky Day is as follows:

- (1) Simultaneous workshops are presented at three different session times
- (2) The Keynote Speaker's Address
- (3) A Career Panel
- (4) Door prizes are given out at the end of the day.

In our first year, 2004, keynote speaker, Dr. Luise-Charlotte Kappe, Professor of Mathematics at Binghamton University, Binghamton, New York, gave the talk entitled *It's a Wonderful Life! - Reflections on a Career as a Mathematician*. The talk was given from both an historical, as well as a personal perspective. The workshop, *Coding Theory in Your Mailbox*, presented at all three sessions by a guest mathematician from the National Security Agency proved to be the hit of the day. Joining her were AUM mathematics faculty who conducted a total of 9 workshops. Other workshop titles included: *Sonia Kovalevsky: Who, What, When, Why?*; *Latin Squares and Cryptography*; and *Fractal Patterns Formed Using Symmetries of a Square*. We were grateful for the volunteer spirit shown by about fifteen of our mathematics students who served from set up to clean up, helping with registration, serving, and directions during the event. On our first Sonia Kovalevsky Day, we welcomed 45 participants, of whom 38 were students. The feedback was virtually all positive. The expenditures for the first year were all covered by the grant from AWM and support from our Vice Chancellor's office.

In our second year, we expanded our coverage by mail-outs, and pre-registration soared to triple that of the previous year. Keynote

speaker, Dr. Tina Straley, Executive Director of the Mathematical Association of America (MAA), delivered the talk entitled *What Does a Mathematician Do?* It received rave reviews from students and teachers alike. Mathematics faculty presented 12 workshops in three sessions and again AUM mathematics students assisted in critical support. Workshops this year included some straight mathematics and some that were math-related but maybe a little unexpected. Some of these were: *Potential Careers in the Space Business*; *How to Program a Simple Video Game*; *Card Games and Combinatorics*; and a workshop on ham radio. We were well pleased with the attendance of 87 young ladies and 23 adults (teachers and parents) - between two and three times that of the previous year.

Due to expanded participation and costs, funding in our second year was increased. In addition to the AWM grant and support from our Vice Chancellor, we received support from an additional campus source, our University Lectures Committee. The committee supported the full amount requested, specifically, those expenses related to the keynote speaker. The Mathematics Department and the School of Sciences covered the remaining expenses generated by this tremendous response. We have not yet experienced the need to go externally to businesses for monetary support, but we have considered for (future events) large and small employers of engineers, statisticians, and computer scientists; and retailers, such as department stores and bookstores, who support education. These contacts need to be made at least two to three months before the event to allow time for application and approval.

We have had significant external support in the form of door prizes. The acquisition and organization is a huge task. While it's true that door prizes don't necessarily attract participants, they may nevertheless encourage them to stay through to the end of the day, and to come back the following year. We realize the importance of networking with our participants, soliciting their input, and acknowledging our gratitude with letters of appreciation. Their input is vital in the planning and success of the following year's event. Many stores have corporate policies restricting contributions. It is important to make a note of this. It is also important to be prepared to provide written documentation for contributions and to make suggestions of appropriate donations for those managers who need a suggestion or need a receipt before making the donation. It is best that receipts and/or invoices be made on letterhead with space for signature, store name, and items donated. Counter-intuitive as it may seem, I found that calling ahead seems to help most managers so that you can make an appointment. Personal contact is important, but so is their time. On the day of the

event, it is a good idea to have every prize labeled with a corresponding note card so that you can proceed in a sequential fashion.

Organizing the food, registration, and signs for the event can be handled in the same way that these matters are handled for other events. Typically, we serve pizza, lots of to-go snacks, bottled and canned drinks, and (surprisingly) more than a little fruit. Door prize stickers, programs and evaluations along with notepads and pencils are placed in folders for each registrant; two or more people are in charge of on-site registration. Our financial aid office has been very helpful in getting some of these folder supplies donated by lending institutions. Having a separate person(s) responsible for technology is essential, as last minute changes always occur, even if technology is set up ahead of time. For outside signs we have used laminated bright copy paper with a bold and extra large font mounted on H-frames to put in the ground. Arrows lead participants to the event.

### Summary

Is it a lot of work? Yes, but it's definitely worth it. We have received numerous compliments on the organization and content of the day's program. We were very encouraged by the fact that every participating school from year one pre-registered for year two. In the spirit of Sonia Kovalevsky Day, it is our aim to involve as many young women in the program and workshops as possible. We would like to recruit more women to present workshops in the future, and we welcome participation from outside the Department of Mathematics at AUM. If you attend (and we hope that you do) we are convinced that you will be impressed by the caliber of young ladies who participate, and will see this event as an investment in the future of some very fine young women who will take their place among the mathematical leaders of tomorrow. This year's Sonia Kovalevsky Day will be held on Saturday, February 24, 2007. For more information and for pictures from AUM's SKDays past, please visit the Mathematics Department pages at [www.aum.edu](http://www.aum.edu).

### References

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