

## Historic STEM Women/Mathematicians

## Hypatia of Alexandria (370-415)

The first woman to make a significant contribution to the field of mathematics is credited with geometry and astrometry contributions in developing the astrolabe, and for the measurement of the positions, motions, and magnitudes of stars. She interpreted Plato and Aristotle to those in Alexandria who inquired and the city loved her. But male rulers envied her, most notably Bishop Cyril. When the university refused his fiat to fire her, he ordered his male monks to kill her. Thus, they dragged her from her chariot into a church where they brutally slashed her to death in the name of God. Bishop Cyril was later elevated to sainthood by the male clergy of the Vatican.

<https://www.agnesscott.edu/lriddle/women/alpha.htm>

## Florence Nightingale (1820-1910)

A statistician who developed new techniques of statistical health analysis previously unknown completely revolutionized health care with her concept that social phenomena could be objectively measured and expressed in mathematical analysis. Her polar-area diagram, what is known today as the pie chart graphic, visibly displayed the medical statistics she collected, tabulated and interpreted then represented proportionally in a wedge of a circle. Her statistical presentations allowed for organizing and improving all areas of medical procedures and initiated a comprehensive medical records system.

<https://www.sciencenews.org/article/florence-nightingale-passionate-statistician>

## Winifred Edgerton (1862-1951)

In 1886, the first American woman to receive a PhD earned it cum laude in the masculine field of mathematics. Her original application to Columbia College was denied because of her gender. But, the male professor of astronomy needed an assistant and, as she was applying not to the College but to graduate school, the trustees, voted to allow her to pursue her advanced studies on a limited tutorial basis. Her work included computations of the orbit of the comet of 1883 (Columbia had the only telescope at the time) and she served on a committee to found Barnard College. Her marriage in 1887 ended her work from which she withdrew due to her husband's objections of the impropriety of committee meetings held in men's offices. When invited to serve on the school board in Albany, her husband deemed it unladylike and forbade her acceptance. She obeyed him. She bore him four children. And she founded the Oaksmere School for girls where she taught for twenty years. In 1926, ten years after her husband's death, she took a position as the librarian at the Barbizon Hotel for women in New York, just one of many libraries that might have contained her research, had she been allowed to research.

<https://www.agnesscott.edu/lriddle/women/merrill.htm>

## Mileva Marity Einstein (1875-1948)

At age 21 in 1896, she was the only woman enrolled in the mathematical section of the School for Mathematics and Science Teachers at Swiss Federal Polytechnic. A student with high grades in math and physics, she was asked by fellow student Albert,

who was awkward in math, to be his study mate. She accepted. He later asked her to be his wife. This she also accepted. He wrote: "How happy and proud I will be, when we two together have victoriously led our work on relative motion to an end!" They married in 1903. During their marriage, he submitted three articles all attributed to Albert, one of which on the "principle of relativity," appeared in a German physics journal. However, his original 1905 article on the "principle of relativity" submission was signed Einstein-Marity. Suggesting one day he might acknowledge her, Mileva allegedly said, "We are both one stone." But Albert alone received the Nobel Prize in Physics in 1921. A plaque at the entrance to their house, reads: "In this house lived Albert Einstein, the creator of the relativity theory, and his scientific assistant and wife, Mileva."

<http://www.teslasociety.com/Mileva.htm>

Euphemia Lofton Haynes (1890-1980)

She earned her master's in education at the University of Chicago in 1930. In 1943, at Catholic University in Washington, DC, she became the first African American woman to earn a PhD in mathematics. She then taught in DC public schools for forty-seven years and was the first woman to chair the DC School Board. At Miners Teacher's College in the District she established the mathematics department and served as its chair. During her time on the Board of Education, she fought racial segregation within the school system and also supported a lawsuit to desegregate the school system. After her death, the Catholic University used a bequest of \$700,000 from her estate to endow a chair and establish a student loan fund in the education department. Subsequent African American women to earn PhDs in mathematics followed her lead. They are listed on the following website.

<http://www.math.buffalo.edu/mad/wohist.html>

Maryam Mirzakhani (1977-)

The first woman to receive the highest honor a mathematician can receive was born in Iran where in 1999 she received a BSc degree in mathematics from Sharif University of Technology in Tehran. Five years later, she earned her PhD from Harvard. She then became an assistant professor of mathematics at Princeton and in 2008 she became a mathematics professor at Stanford. Nobel Prizes established in 1901 exist for Physics, Chemistry, Physiology/Medicine, Literature, and Peace, but not for Mathematics. The Fields Medal established in 1936 and the Abel Prize (2001) often are described as the mathematician's "Nobel Prize." As of 2016, fourteen Abel Prizes have been awarded, with none awarded to a woman, and fifty-six Fields Medals have been awarded including the first to a woman in 2014, and to date the only, awarded to a woman mathematician.

<https://www.washingtonpost.com/news/morning-mix/wp/2014/08/13/a-woman-wins-nobel-prize-of-math-for-the-first-time/>