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# February 11: International Day of Women and Girls in STEM

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*Worldwide, the proportion of women in STEM fields is increasing, but unevenly. In the United States, for example, women earned 49% of STEM degrees in 2017. However, while they are the majority in biology (62%), their presence drops sharply in quantitative disciplines: 39% in geosciences, 22% in engineering, 42% in mathematics, 19% in computer science, and 40% in physical sciences.*

## 1 France Lagging Behind in Gender Parity in STEM Fields: A Global Phenomenon?

In 2022, École Polytechnique celebrated the 50th anniversary of opening its entrance exam to women. On this occasion, the institution's director set a clear goal: *20 % de candidates, 20 % admises*. Yet, in 2024, the school admitted only 16% women, a significant drop compared to 2023 (21%), when the proportion of female candidates had indeed reached 20%. This observation raises questions about the place of women in scientific fields. More broadly, women represented only 28% of students in engineering schools in 2023 (Conférence des directeurs des écoles françaises d'ingénieurs). However, this figure hides substantial disparities across disciplines: while women remain underrepresented in other prestigious institutions, such as Arts et Métiers (16%) or École des Mines (29%), they are the majority in agronomy, biology, or chemistry schools (65% at AgroParisTech). This low presence of women in STEM (Science, Technology, Engineering, and Mathematics) is all the more striking given that women overall dominate higher education: in 2021, they earned 55.8% of degrees in France. It is in this context that the International Day of Women and Girls in Science, established in 2015 and celebrated every February 11, aims to highlight the slow progress of gender parity in these disciplines.

[1] In the United States, for example, women earned 49% of STEM degrees in 2017. However, while they were the majority in biology (62%), their presence dropped sharply in quantitative disciplines: 39% in geosciences, 22% in engineering, 42% in mathematics, 19% in computer science, and 40% in physical sciences.

Worldwide, the proportion of women in STEM fields is increasing, but unevenly[1]. For instance, although the absolute number of women in mathematics, statistics, and computer science has grown since the 2000s in the United States, their share has declined due to a faster increase in the number of men in these fields. Conversely, the percentage of women holding a doctorate in engineering has risen from 16% to an average of 25%, though disciplines like computer science (23%) and mathematics-statistics (27%) still lag behind.

### 1.1 Europe and Its Disparities: Slow but Steady Progress

Trends observed in Europe confirm these persistent inequalities. According to Eurostat, the share of women graduating in STEM fields at the doctoral level was 33.2% in 2015 and 35.4% in 2021. Some countries stand out, such as Romania with 42.5% women, Poland (41.5%), Greece (40.9%), and Italy (39%). However, as in the United States, women are overrepresented in life sciences (67.8% of graduates in 2021) and underrepresented in engineering, construction, and manufacturing (27.2%), as well as in physics (2%). The only notable exception is mathematics, which shows better gender parity, with 48.1% of graduates being women.

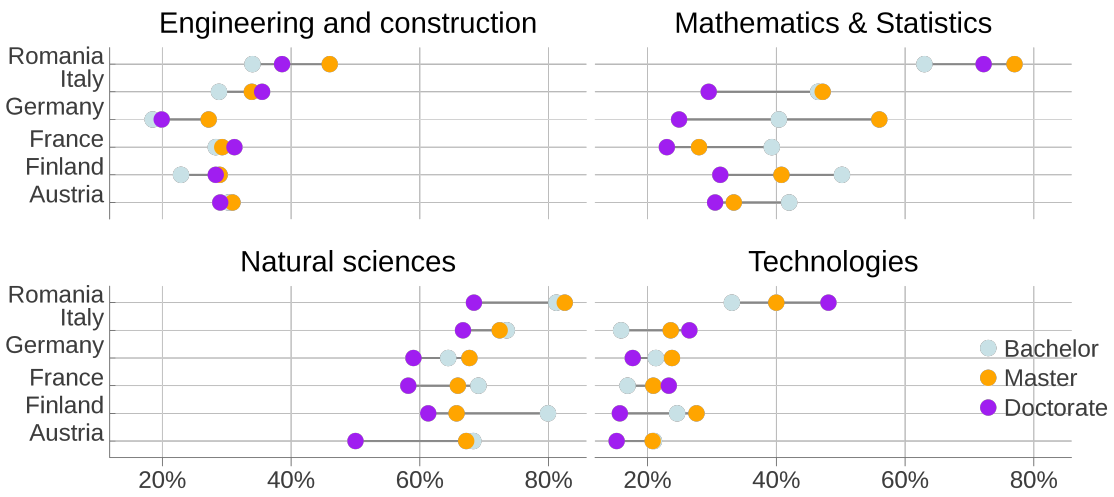
France's statistics are close to the European average in terms of the share of women graduates in STEM fields (31.5% in 2015, 32% in 2021), but some trends are concerning. In particular, the proportion of female engineers and physicists in higher education has never exceeded 25%. In fact, the share of women graduating in engineering, construction, and manufacturing dropped by 12% between 2015 and 2021, from 26.7% to 23.6%, while the European average remained stable at around 28%. In science and technology professions, France consistently lags 2 to 3 points behind the European average, fluctuating between 16.9% and 19.3%.

Finally, one of the most striking findings concerns mathematics: in 2021, women represented only 33% of graduates in France, compared to 48% in Europe. This trend persists when considering all graduates in mathematics and statistics, where women made up 33.8% in France versus 44.2% in Europe.

### 1.2 The "Leaky Pipeline": A Global Barrier to Women's Participation in Research and Innovation

The *leaky pipeline* is a metaphor that describes the gradual disappearance of women as they climb the ranks in academia and the professional world — a process that begins even before university entry and continues into the labor market (Speer, 2023). In France, although women earn nearly two-thirds of bachelor's and master's degrees, they account for only 40% of doctoral students (graphique 1). In STEM fields, the share of women earning doctorates drops even further: 35.4% of doctoral students in 2021, compared to 36.9% in Europe. This attrition is more pronounced in disciplines where women are highly represented, such as biology (over 60% at the undergraduate level). Paradoxically, in more quantitative disciplines like engineering, the proportion of women remains stable at around 30%..

**Graphique 1:** Proportion of Women Graduates in STEM by Country and Level of Education




*Lecture* : In France, 39.3% of bachelor's degree graduates in Mathematics and Statistics were women, representing 28% of master's graduates and 23% of doctoral graduates.
*Sources* : Eurostat (data for 2021), calculs des auteurs.

This *leak* continues into the professional world. While women represent 38% of PhDs in STEM in the European Union, only 17.9% of tenured professors in engineering and technology are women (Research & Innovation, 2022). The digital sector is particularly affected: in 2023, only 18.4% of female graduates in digital fields in France were employed, a figure that resonates with the persistent difficulty in seeing women exceed 20% of specialists in *Information and Communication Technologies* (ICT). Furthermore, despite a 21% increase in the number of women in high-tech jobs in France between 2013 and 2022, this progress remains below the European average of 35%. This lag highlights the need for concrete actions to strengthen the presence of women in scientific disciplines, particularly in the more quantitative fields.

### 1.3 Beyond Institutional Efforts: What Leverage for Action?

These play a decisive role in students' career choices, an area where formal initiatives often struggle to compete. According to the Genderscan 2021 survey, 43% of female students in France identify their family and friends as the main factor influencing their choice of education. Teachers also play a key role, being cited by 40% of female STEM students, and more particularly by 32% of those in the digital field.

However, this surrounding environment can also discourage young girls. According to the same survey, 33% of female students in digital fields report that their relatives made them feel that this area would be hostile to women and would not be a *female-friendly profession*. Furthermore, nearly 60% of female STEM students cite teachers as their primary source of discouragement. A study by Ipsos conducted at a computer science school reinforces these findings: only 33% of girls are encouraged by their parents to pursue careers in the digital field, compared to 61% of boys.

These results underscore the urgency of addressing gender stereotypes by raising awareness among both families and teachers, in order to create an environment conducive to a more balanced career orientation. In this regard, Breda *et al.* (2023) shows that connecting high-achieving female high school students in science with female role models in STEM fields, without focusing on the underrepresentation of women in these areas, encourages their enrollment in scientific disciplines at the higher education level.

Breda T., Grenet J., Monnet M., Van Effenterre C. (2023). “How effective are female role models in steering girls towards STEM? Evidence from french high schools,” *The Economic Journal*, *133*, n° 653, pp. 1773–1809.

Speer J.D. (2023). “Bye bye ms. American sci: Women and the leaky STEM pipeline,” *Economics of Education Review*, *93*, p. 102371.

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