

Universidad Autónoma del Estado de  
Morelos

# Women and outer space

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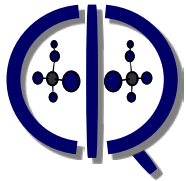
# Universidad Autónoma del Estado de Morelos

Education, research, innovation and public outreach



507 Full-time Professors  
82.6% Ph.D. degree  
50% women  
Population: 1,903,811 (2015, 23rd)  
The highest academic capacities among the Public State Universities in Mexico.

*Tercer Informe de Actividades 2105, Rector Dr. Jesús Alejandro Vera Jiménez  
Secretaría de Educación Pública*



## Chemistry Department

Centro de Investigaciones Químicas



## Engineering Department

Centro de Investigación en Ingeniería y Ciencias Aplicadas



## Biology and Biochemistry Department

Centro de Investigación en Dinámica Celular



## Physics, Mathematics and Computational Sciences

Centro de Investigación en Ciencias

# Instituto de Investigación en Ciencias Básicas y Aplicadas



## Graduate programs:

Biochemistry, Physics, Mathematics,  
Chemistry, Industrial Engineering,  
Chemical Engineering, Electronics.

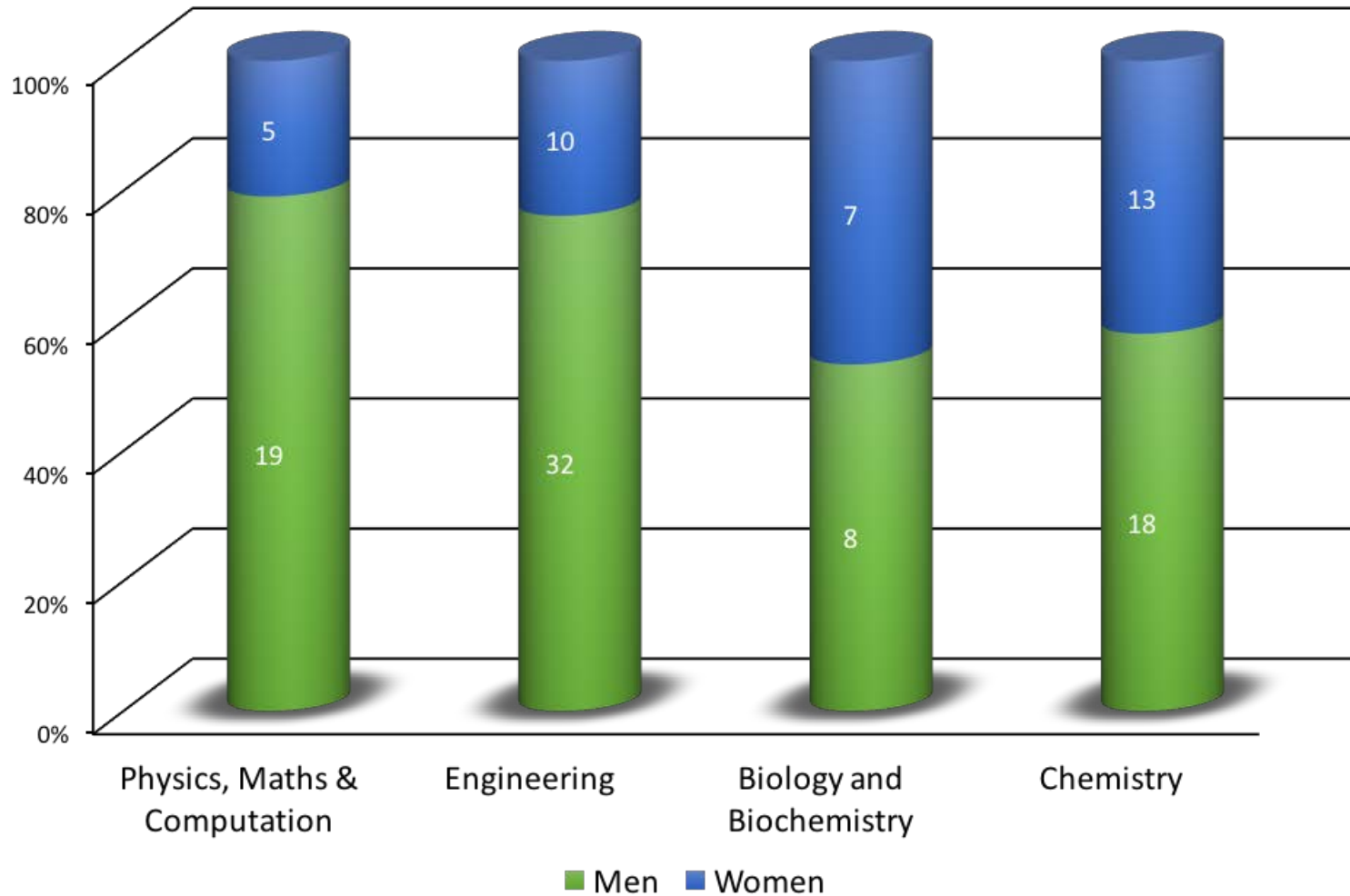
## Postgraduate programs (Master and Doctorate degree):

Chemistry, Physics, Cellular and  
Molecular Biology, Energetics  
sustainability, Engineering and Applied  
Sciences.

490 students in both programs attended  
by 168 full-time Professors.



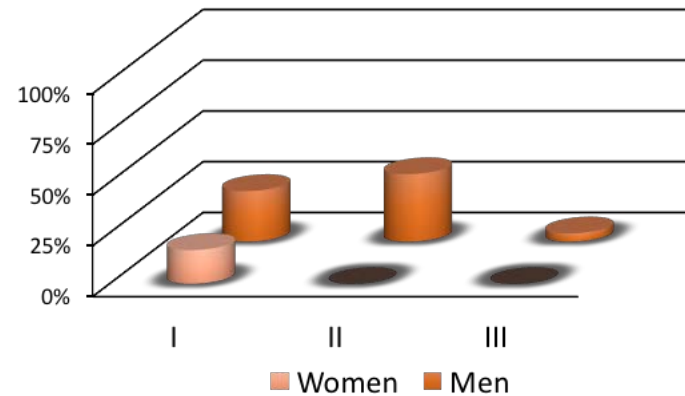
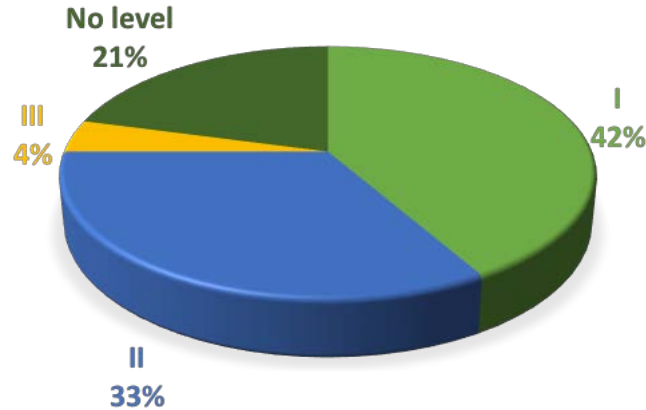
# Gender distribution of full-time Professors at IICBA



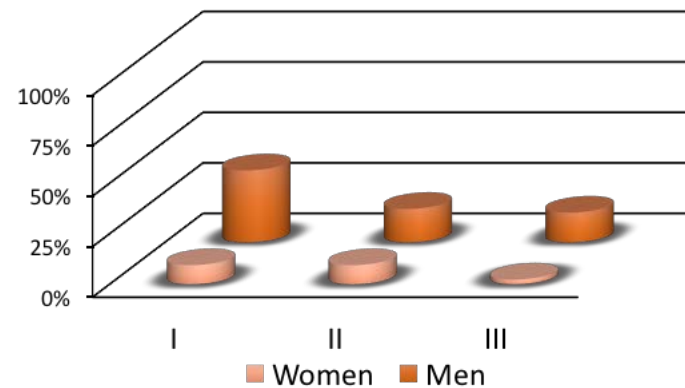
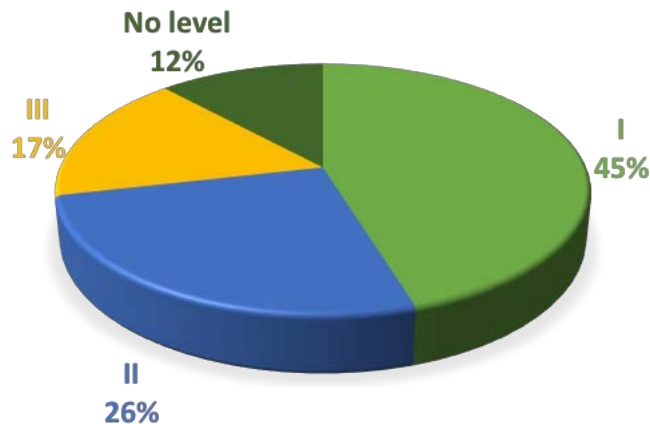


# Academic merits of full-time Professors at IICBA

## Physics, Mathematics and Computational Sciences

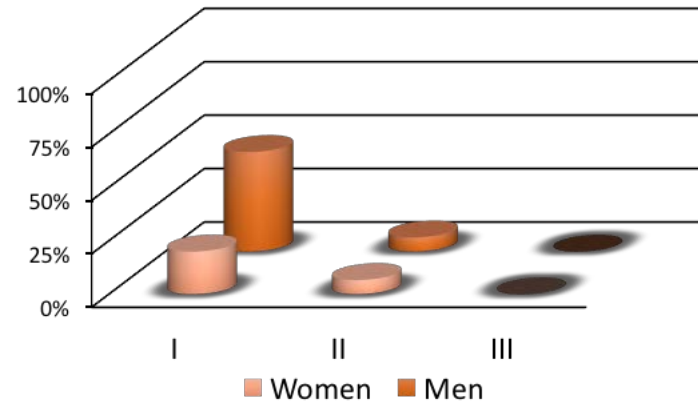
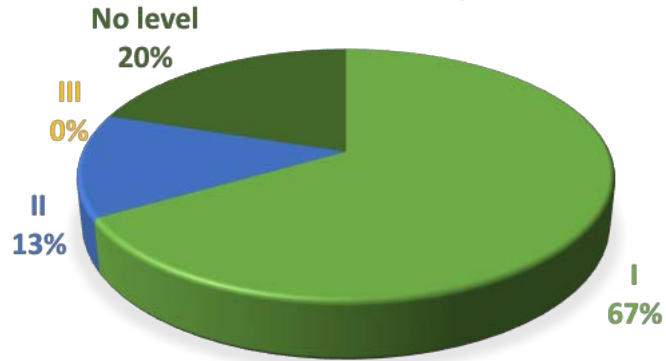


## Engineering Department

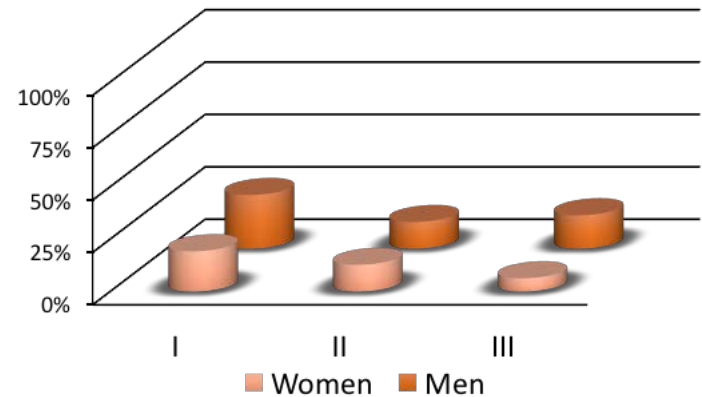
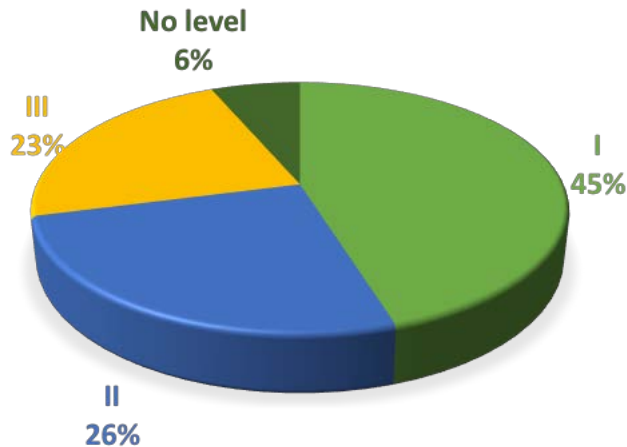


# Academic merits of full-time Professors at ICCBA

## Biology and Biochemistry Department

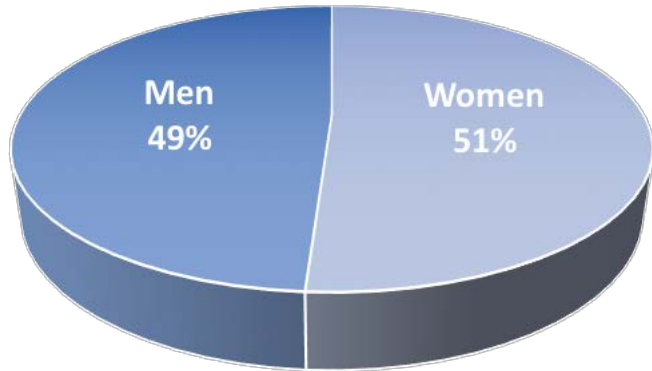


## Chemistry Department



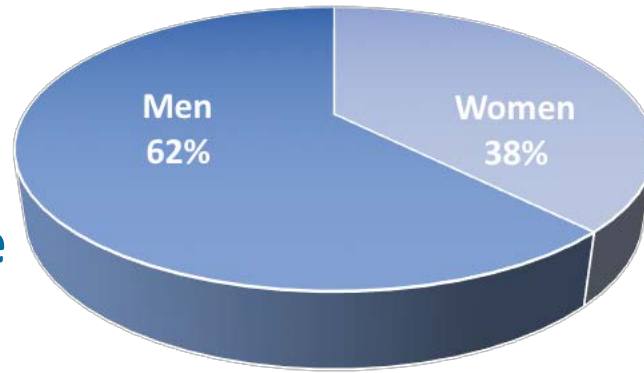
# Student's gender distribution at IICBA

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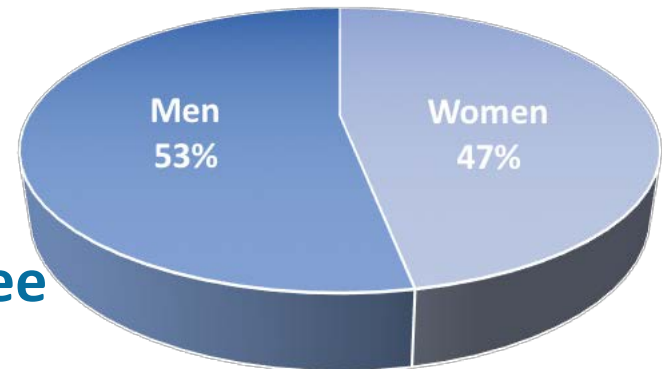


**Undergraduate level**

**Master degree**



**Doctorate degree**





# Astrobiology

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Scientists are dedicated to the study of the origins, evolution, distribution, and future of life in the Universe.

**Interdisciplinary** field that requires a comprehensive, integrated understanding of biological, planetary and cosmic phenomena. It encompasses **the search for habitable environments** in our Solar System and on planets around other stars, the search for **evidence of prebiotic chemistry** or **life** on the SS bodies, and the **diversity of life on Earth**.

*NASA Astrobiology Institute, 2015*



# Astrobiology in Mexico

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The Mexican Society of Astrobiology (SOMA) was created by Mexican researchers and people dedicated to the popularization of science in 2000.

SOMA is a non-profit, self-sustaining organization that joins a group of multidisciplinary researchers, undergraduate and graduate students, teachers, journalists and people interested in promoting the knowledge and progress of Astrobiology in Mexico.



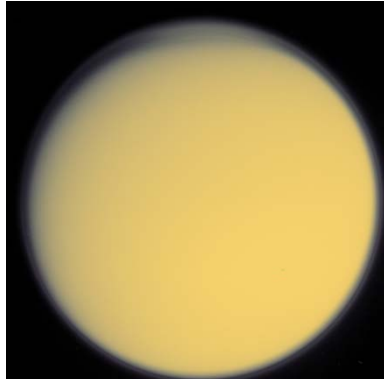
# SOMA Activities

- Biannual Meeting (2016), Mexican Astrobiology School (2017).
- Seminars, round tables, movies, EPO activities (Lottery, Guess who?, Engineering cards, Planets in a bottle, Distances at the SS)
- Curricula for Astrobiology courses at undergraduate and graduate levels (FC-UNAM, FC-UABC, FCB-UAEM, P. Astrofísica-UNAM).
- Identification of Mexican sites of astrobiological interest (web site).
- Astrobiology book written in Spanish by Iberoamerican researchers (2<sup>nd</sup> semester of 2016).
- Thematic posters and booklets for popularization of Astrobiology.
- Links with national (Universities, INAOE, AEM), and international institutions (NASA, EANA).
- Funds from CONACyT, Universities, AMC.



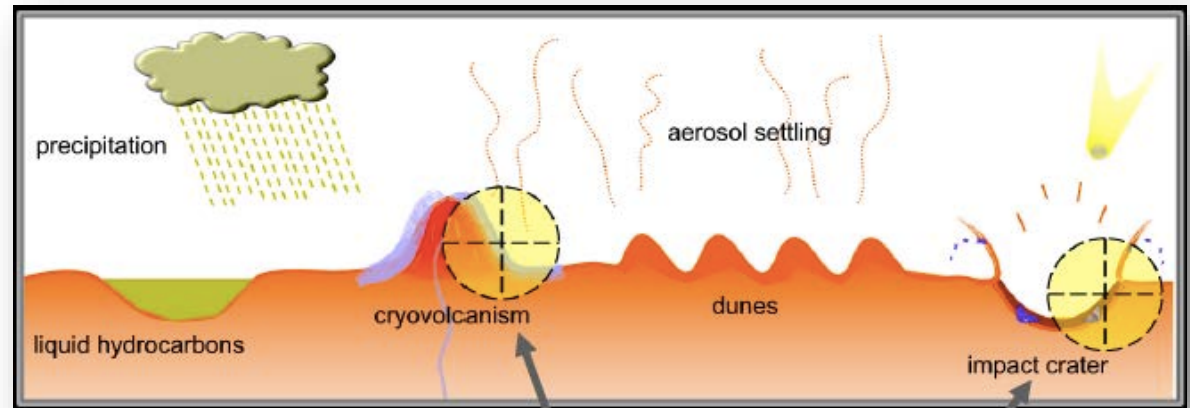
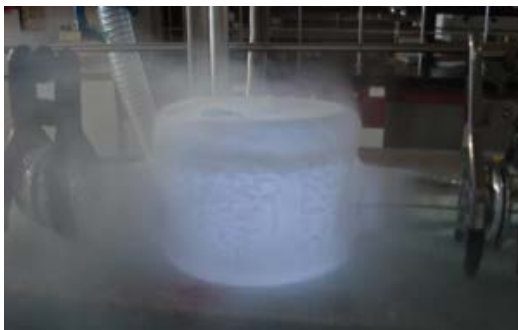
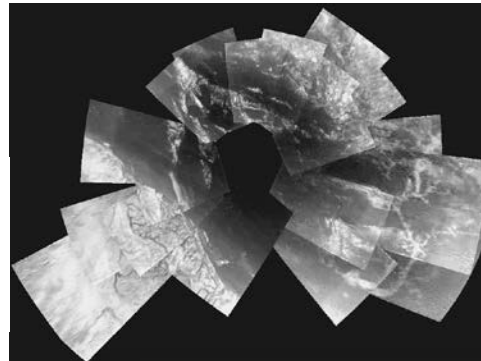


# Astrobiology at UAEM



**Titan**  
Voyager, HST,  
Cassini-Huygens

Open **liquid superficial bodies**, rich atmospheric chemistry.

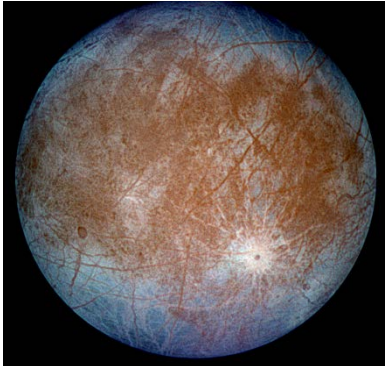


Ramírez et al. *Faraday Discuss.* 2010; Coll et al. *PPS* 2011; Poch et al., *PSS* 2012

# Astrobiology at UAEM

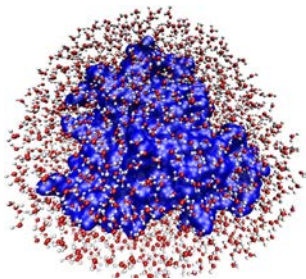
## Europa

Voyager and Galileo, direct and indirect observations

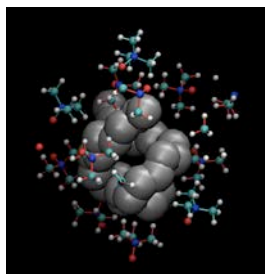
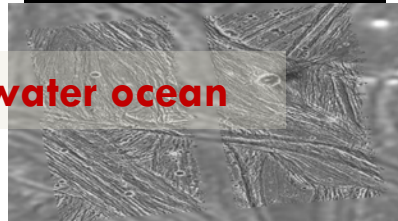


Icy crust, salty

liquid water ocean



## Ganymede

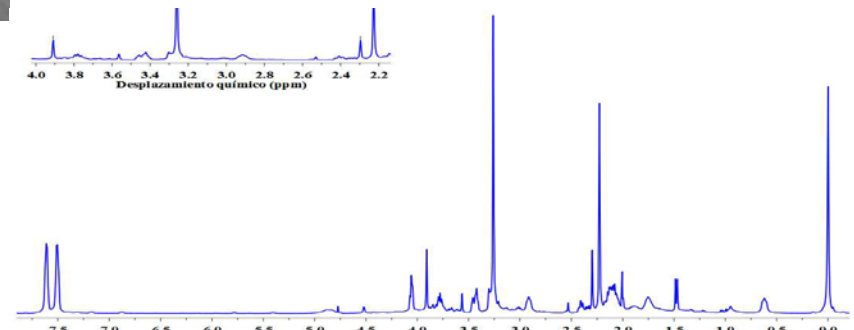
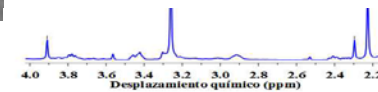
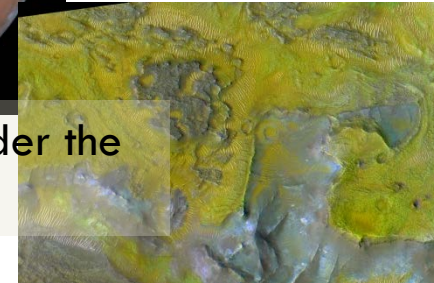


## Mars

Viking, Phoenix, Pathfinder, Global Surveyor, Reconnaissance, Curiosity



Liquid water under the surface, sulfates



Avendaño, et al., BSGM 2015; Ramirez et al., IAC2015; Ramirez et al., in preparation

# Research group



Consejo Nacional de  
Ciencia y Tecnología

**promep**



Grant 249086



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

Proclaimed on 15 December 2015 by the United Nations General Assembly



## *Transforming the World: parity in Science*

Gender equality and the empowerment of women and girls will make a crucial contribution not only to economic development of the world, but to progress across all the goals and targets of the 2030 Agenda for Sustainable Development.

... through **education** and **public awareness-raising activities**, promote the full and equal participation of women and girls in education, training, employment and decision-making processes in the sciences, **eliminate all discrimination against women**, and overcome legal, economic, social and cultural barriers to **encourage greater participation of women and girls**, promote career development for women in science and **recognize the achievements of women in science**.

# The first Mexican girl to win a golden medal in Mathematics



Olga Medrano Martín del Campo  
Alka Xavier Earathu, silver medal

#LadyMatemáticas

*European Girls' Mathematical Olympiad*

# Recommendations

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- ❑ Expose girls to successful female roles in space science.
  - => "Sharing a day with ....."
  - Pairing of young professional with senior professional
  - Offer mentoring activities: leadership events, provide training on grants applications and on writing publications.
  
- ❑ Foster societal interests in scientific disciplines to ensure an effective provision of girls in these areas.
  - => "Great inventions done by women"
  - The medical syringe. Letitia Geer in 1899
  - The dishwasher. Josephine Cochrane in 1887
  - Wireless transmission technology. Hedy Lamarr in 1940's
  - COBOL Computer software. Grace Murray in 1959-1961
  - Kevlar. Stephany Kwolek in 1965

*Gender, science and technology. Report of the expert group meeting. UNDAW in cooperation with UNESCO*

## *Recommendations*

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❑ Women who graduate in science and technology subjects do not necessarily transition to a career in these fields.

=> Attraction, recruitment, promotion, **retention**, and recognition are key points where strategies are needed.

❑ The unequal sharing of family responsibilities is an important reason for the underrepresentation of women in S&T. Caregiving activities make it more difficult for women to establish the necessary record to obtain a senior, permanent position.

=> Family friendly policies like parental leave, a daycare supplement, childcare centers with extended opening hours (7:00 to 20:00), are needed.

# Science as a tool to break all kind of borders

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The number of women in STEM (Science, Technology, Engineering, and Mathematics) falls continuously from secondary school to universities, laboratories, teaching, policy making and decision making.

In the formal sector of STI (Science, Technology and Innovation), women globally make up under 10% of those in innovation hubs and those receiving funding by venture capitalists, and only 5% of membership in national academies in science and technology disciplines.

Lakshmi Puri, UN Assitant Secretary General, UN Women Deputy Executive Director

Promoting science and technology to support women's development and livelihood activities: grow business or social enterprises, improve health opportunities and services, energy, environment and natural resources management, infrastructure development, enhance education, learning opportunities and skill development.

Engage with youth to advocate for their interests, rights, and social transformation.