

Summer School Learning Plan

Girls do STEM!

Laboratory technology and products of everyday life

We offer girls to recognize in detail with things of personal consumption they can meet in everyday life. They can use labs and appropriate technologies i.e., sensors for measuring and for recognizing principles and processes connected with food, cosmetics, washing means, connection science and art, connection ethics and biology etc. They can use different lab approaches, technologies, devices, and analytical means. This will attract girls for STEM through their main interest about daily used products.

They can discover through own lab activity during the summer camp: content of “healthy” and “unhealthy” food products, natural science principles in simple experiments with substances of daily consumption, active parts of washing means, how to replace traditional products by more nature-friendly means and procedures, and many other interesting things, phenomena, and procedures. Integrating part is also discussion about gender stereotypes in science and technology.

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Coordination: Prof. Dr. Katja Maaß, UNIVERSITY OF EDUCATION FREIBURG, Germany. Partners: UNIVERSITEIT UTRECHT, Netherlands; UNIVERSITA TA MALTA, Malta; UNIVERZITA KONSTANTINA FILOZOFA V NITRE, Slovakia; UNIVERSIDAD DE JAEN, Spain; ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON, Greece; UNIVERZITA KARLOVA, Czech Republic; SCHOOL OF EDUCATION AND COMMUNICATION, Jonkoping; EDEX – EDUCATIONAL EXCELLENCE CORPORATION LIMITED, Cyprus; VILNIAUS UNIVERSITETAS, Lithuania.



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CUNI GEM Summer School

Target Group:

12-16 years, lower and upper secondary schools.



Venue:

Charles University, Faculty of Education, Department of Chemistry and Chemistry Education, Prague, M. Rettigová 4.

Transportation to the venue / digital access to the Summer School:

Brought by parents or teachers.

Subsistence:

Lunch and refreshments.

Contact person for girls and their guardians:

RNDr. Kateřina Chroustová, Ph.D., Katerina.chroustova@pedf.cuni.cz.



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Schedule

Thursday, 23. June

9:00 – 9:05	Welcome at Faculty of Education Charles University
9:05 – 9:30	Organizational issues (questionnaires, offer of meals to lunch)
9:30 – 10:30	Gender stereotypes in science
10:30– 10:50	Break
10:50 – 12:20	Groups <ul style="list-style-type: none"> • Group I: Chemistry and Art • Group II: Colours and Chemistry Lab • Group III: We Measure with a Computer in a Chemistry Lab
12:20 – 13:25	Lunch
13:25 – 14:55	<ul style="list-style-type: none"> • Group I: Colours and Chemistry Lab • Group II: We Measure with a Computer in a Chemistry Lab • Group III: Chemistry and Art
14:55 – 15:15	Break
15:15 – 16:45	<ul style="list-style-type: none"> • Group I: We Measure with a Computer in a Chemistry Lab • Group II: Chemistry and Art • Group III: Colours and Chemistry Lab
16:45 – 17:00	Summary of the first day – discussion with researchers

Friday, 24. June

9:00 – 9:05	Gathering at Faculty of Education Charles University
9:05 – 9:10	Organizational issues
9:10 – 10:40	How Can Coloured Gold Improve Microscopy?
10:40– 11:00	Break
11:00 – 12:30	Hunting and Trade in Animals
12:30 – 13:25	Lunch
13.25 – 14.40	Group work <ul style="list-style-type: none"> Group I: Natural Science Principles in Simple Experiments with Substances of Daily Consumption Group II: How the Substances around us are Separated in the Chemistry Lab
14.40 – 15.00	Break
15.00 – 16.15	Group work <ul style="list-style-type: none"> Group I: How the Substances around us are Separated in the Chemistry Lab Group II: Natural Science Principles in Simple Experiments with Substances of Daily Consumption
16.15 – 17.00	Closing ceremony (questionnaires, certificates)



Learning Activities

Learning Activities	STEM/ICT subject knowledge	Knowledge of inspiring role models and their meaning	Knowledge about the STEM/digital world of work	Entrepreneurial mind-sets	Transversal skills
Lecture about gender stereotypes in STEM	x	x		x	x
Connection of science and art	x		x		x
Measuring with sensors	x		x	x	
Lab activities	x	x	x		
Modern microscopy principles	x	x	x	x	
Ethics in animal world		x		x	x
Natural Science Principles	x	x	x		



During our summer school, girls will undertake a journey of discovering different view to science and technology, mainly chemistry and biology. They will take part in lectures for introduction of analysed phenomena or substances and workshops in labs contenting activities with sensors, analytical devices, and lab synthesis. Important parts of the program will be also discussions with experts working in area of science/chemistry research (mainly women) including the gender stereotypes community. Participants will recognize various principles of everyday life products and their preparing, using, and recycling, try different lab procedures, receive experience from scientific activities and gain orientation in procedure to how to become a scientist.

During the immersion experience in real lab work, girls will be exposed to role models working in specific task in chemistry/ STEM oriented fields. The female role models will also share their personal and professional experiences, discussing challenges they have encountered and how they solved it, thus facing gender stereotypes.

Working on real research activity related to relevance issues for society, girls will learn about specific STEM contents through a hands-on approach enhancing the feeling of self-competence and efficacy. Girls will also have the chance to know about different STEM subjects during lectures and workshops about Nanotechnology, Microscopy, Bioethics, Zoology and Analytical Separation.

Furthermore, workshops, especially workshop with sensors, will be focused on the use of digital skills and resources to solve effective using of data gained from real experiment and also from relevant databases for comparison.

In addition, the GEM Summer School will promote girls' transversal skill in all the activities planned, especially in those such as discussions with women working in different research fields and institutions, during common lunches and free time, during working with mentors or during own presentations in session about science principles.

During all summer school we will take attention to teamwork, tolerance, organizational skills, enthusiasm, self-motivation, open-mindedness, and communication strategies while building up the GEM community.

One of the most important central themes of the GEM is the offering of opportunities for the development of entrepreneurial minds in the participating girls. This aspect will be applied as crosslink during whole program and will flower in own work and presentation for other in session about science principles organised in last half day. In fact, we propose that girls in pairs present a science principle in simple experiment prepared before their show, we provoke their own initiatives and creativity.

With the aim of guiding girls in this process, lecturers, mainly women, will present and discuss with girls ideas and entrepreneurial strategies from own experience and consequent knowledge.

Finally, the common thread of all the activities planned for this GEM Summer School is the connection between girls and female role models in STEM. These female role models are essential for girls to



build their scientific identity and will be represented during the School by mentors, leaders of cutting-edge research and groups, inspiring and motivating lecturers and speakers, as well as females in leading positions. All these women along with the girls will be part of the GEM community in which the STEM identity is associated with an inclusive environment and a positive learning experience. As a whole, we offer arrange of communicative, playful, interactive and experiential activities to engage female in the GEM Summer School with the aim of allowing them to:

- Become aware of the wide range of fascinating professional activities related to STEM and led by women.
- Take part in real research activities guided by inspiring mentors.
- Realize the empowerment feeling while designing, defending and leading an entrepreneurship idea.
- Acquire digital skills related to the use of technical devices for data collection and data management.
- Develop creativity and decision-making skills related to the participation in a presentation of science principles.
- Develop digital skills related to the use of ICT for the presentation and communication of research results.
- Develop their identity in scientific research and/or STEM professional fields.

In this way, the GEM Summer School in Czechia will contribute to the project's objectives and promote:

- Girls with knowledge of inspiring role models and their meaning.
- Girls with knowledge about the STEM/digital world of work.
- Girls with entrepreneurial mind-sets.
- Girls with transversal skills.



Lecturers and mentors



RNDr. Kateřina Chroustová, Ph.D., CUNI

She studied chemistry and mathematics teaching for secondary schools and subsequently chemistry didactics at the University of Hradec Kralove Faculty of Science. She currently works at the Faculty of Education of the Charles University, where she participates in the teaching of future chemistry teachers. Her scientific activity focuses on topics from the didactics of chemistry, especially in the area of digital technologies or experimental activities. In her free time, she goes to the theater and likes to sing. Motto: *"It's never too late to start anything!"*



Prof. PhDr. Martin Bílek, Ph.D., CUNI

He graduated as a teacher of chemistry and physics for secondary schools and has devoted his entire academic career to the education of teachers of science and technical subjects, especially chemistry. He represents Charles University in the ICSE consortium, founded at the Pedagogical University in Freiburg, Germany, which is the main coordinator of the GEM project. The ICSE Consortium website (icse.eu) has a lot of information to support the teaching of science and engineering subjects, including additional projects, problem solving guides, etc. Motto: *"Girls, don't be afraid of chemistry, it's all around us, and it won't hurt us if we will know what it means and how to use it!"*



Mgr. Markéta Brabcová and Mgr. et Mgr. Gabriela Langhammerová, Sociological Institute, Czech Academy of Sciences

Researcher from the National Contact Centre - Gender and Science department of the Institute of Sociology of the Czech Academy of Sciences. They deal with the issue of institutional change in scientific and research organizations, as well as structural obstacles in science and research, which especially women

scientists face during their careers. Markéta studied law and is completing gender studies, Gabriela studied theology, philosophy and gender studies, and is completing her doctoral studies. Motto: *"Women and girls belong in science!"*



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Assoc. Prof. Štěpánka Kučková, Ph.D., CUNI

She studied analytical chemistry at the Faculty of Science of the Charles University and biochemistry at the Chemical University in Prague. He currently works at both universities, but at the Charles University he is now dedicated to training future teachers. From a scientific point of view, he mainly deals with the analysis of art objects and proteomic analyses of the blood plasma of patients with oncological and neurodegenerative diseases. She is always greeted at home by two Maine coon cats upon her return. Motto: *"Life is short, do what you enjoy!"*



Ing. Tatiana Smirnova, CUNI

She graduated from the Chemical University in Prague in the field of Biochemistry. Since his bachelor's degree, he has been engaged in protein analysis using various analytical methods. He is currently continuing his doctoral studies at the Chemical University in Prague. At the same time, she is an assistant professor at the Department of Chemistry and Chemistry Education of the Faculty of Education of Charles University, where she leads exercises and laboratories in analytical chemistry. Motto: *"If you want something, it can definitely be done!"*



Assoc. Prof. RNDr. Vladimíra Petráková, Ph.D., Heyrovsky Institute of Physical Chemistry Czech Academy of Sciences

She graduated from the Faculty of Biomedical Engineering of the Czech Technical University. In her doctoral thesis, she dealt with research on luminescence centre in diamond for biomedical applications. Thanks to a Humboldt scholarship, she spent three years at the Free University of Berlin, where she switched from nano-diamonds to the study of gold nanoparticles. Since 2019, he has been working at the Heyrovsky Institute of Physical Chemistry of the Czech Academy of Sciences, where, thanks to prestigious grant support, he is establishing his own research group. It deals with how to use plasmonic nanoparticles to improve super-resolution microscopy. She is one of the founders of the organization Czexpats in Science, which brings together Czech scientists abroad. She has four children, the daughter is sixteen, the sons are ten, eight and the youngest is two years old. Motto: *"Don't give things up!"*





PhDr. Karel Vojíš, Ph.D., CUNI

He graduated as a teacher of biology and chemistry at the Faculty of Education of the Charles University. He subsequently obtained his doctorate at the Faculty of Natural Sciences of Charles University. He currently works at the Department of Biology and Environmental Studies, Faculty of Education, Charles University, where he participates in the training of future teachers. His research focuses mainly on the science curriculum, activation methods in teaching and the skills of future

science teachers. Motto: "*He who seeks finds.*"



Mgr. Adam Nejedlý, CUNI

He studied biology and physical education. He is currently continuing his studies as part of a doctoral course focused on biology didactics at the Faculty of Education of Charles University. The research focuses mainly on the scientific skills of pupils and future teachers. At the same time, he works as a teacher at Davle Elementary School. Motto: "*We learn for life.*"



Jana Fiřtová, CUNI

She graduated in food industry and worked as a foreman in confectionery production. She then moved to the Department of Chemistry and Chemistry Education of the Faculty of Education of the Charles University and is responsible for laboratories, preparation of laboratory activities and other similar activities. Motto: "*Girls, don't be afraid of the laboratory, chemistry is beautiful!*"

CUNI GEM Summer School Support Site

You can find more information about the Summer School in the national language by following this link: <https://pages.pdf.cuni.cz/kch/vyzkum/resene-projekty/gem/>



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