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ChemTeach REPORT

EDUCATIONAL COURSE FOR HIGH SCHOOL TEACHERS IN BANJA LUKA

Faculty of Natural Sciences and Mathematics, University of Banja Luka, Banja Luka, Bosnia and Herzegovina

Banja Luka, June 9–13, 2025

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WP2: DEFINITION OF NEEDS

Activitiy: Educational course for high school teachers

Report prepared by: Gimnazija Banja Luka

Erasmus+ Project

Improvement the quality of chemistry teaching in VET in Bosnia and Herzegovina

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CONTENT

INTRODUCTION

The Educational course for B&H high school teachers in Banja Luka, as part of the ChemTeach project (Improvement of the quality of chemistry teaching in VET in Bosnia and Herzegovina, Project No. 101129417), was held at the Faculty of Natural Sciences and Mathematics, University of Banja Luka, from June 9th to 13th, 2025.

The five-day program was designed to strengthen the pedagogical and digital competences of vocational chemistry teachers, focusing on integrating modern approaches like STEAM, utilizing chemistry for popularization, connecting with the labor market, and developing practical digital and laboratory skills. The course involved teachers from Bosnia and Herzegovina and was led by professors from the University of Banja Luka (UNIBL) and the Slovak University of Technology in Bratislava (STU).

Monday, June 9, 2025 (Day 1)

The training began with registration and Welcome Remarks and Training Program Overview. The thematic focus of the first day was on modernizing the role of chemistry in education and cross-disciplinary approaches.

- Modern Pedagogical Concepts: Prof. Milica Balaban introduced the topic of Chemistry in Education: Beyond the Formula - Time for a New Role. This was followed by sessions on Integrating the STEAM Approach in Modern Education (Prof. Sanja Partalo) and Enhancing Biochemistry Teaching Through the2 STEAM Framework (Prof. Dino Hasanagić and Prof. Sanja Partalo).
- Chemistry and Society: A unique session on Chemistry and Science Diplomacy: Molecules of Peace in the 21st Century was led by Prof. Nina Sajić.
- First-Hand Experience: The afternoon was dedicated to a Secondary Schools Visit, providing participants with an opportunity to see the teaching environment in practice.

Tuesday, June 10, 2025 (Day 2)

The second day focused on utilizing chemistry for popularization, exploring intriguing applications, and connecting with stakeholders.

- Chemistry Popularization (Part I): Educational lectures designed to popularize chemistry included sessions on Homo olfactoricus and Booze and hangover, both delivered by Prof. Ing. Peter Szolcsanyi. Mgr. Liudmyla Khvalbota presented on the theoretical and applied aspects of Isotope ratio mass spectrometry.
- Industry and Education Dialogue: The afternoon featured a Round table on advancing chemistry teaching with stakeholders. This session aimed to deepen the connection between teaching practices and the expectations of the labor market, involving a broad panel of experts.

Wednesday, June 11, 2025 (Day 3)

The third day continued the popularization theme and introduced hands-on laboratory demonstrations.

- Chemistry Popularization (Part II): Prof. Ing. Peter Szolcsanyi presented intriguing topics such as From poison to drug and Medicinal marijuana. Prof. Ing. Ivan Špánik led a lecture on Food authenticity assessment.
- Advanced Laboratory Demonstrations: The afternoon was dedicated to practical work, including the determination of the stoichiometry and stability constant of an iron(III)-salicylate complex (spectrophotometry) and the determination of hypochlorite in bleach (iodometric titration), led by Ing. Martin Němeček and Ing. Tatiana Filipová. Another practical demonstration focused on Exploring the Role of Ingredients in Cosmetic Products (Ing. Marta Fodorová).

Thursday, June 12, 2025 (Day 4)

Day four was heavily focused on the crucial aspect of digitalization in education and fun, engaging laboratory work.

- Digital Content Creation: A significant portion of the day was dedicated to a two-part workshop on Creating educational video tutorials: A guide for secondary school teachers, led by Ing. Krištof Urban and Prof. Ing. Ivan Špánik. This activity directly addresses the need for modern, engaging multimedia teaching materials.
- Applied Lab Work: The afternoon featured exciting, student-friendly laboratory work on Maillard's reactions (preparing caramel lollipops) and the Detection of acids in milk products (Ing. Lucie Křivčíková). Further demonstrations included the Determination of vitamin C in fruit, Dactyloscopy, and the Detection of human salivary amylase.

Friday, June 13, 2025 (Day 5)

The final day focused on project management, cutting-edge technology, teacher wellbeing, and future planning.

- Project and Dissemination: Mgr. Justina Pluktaitė led sessions on Project management, administration and dissemination, including topics like podcasting and utilizing international channels.
- Future Technology and Wellbeing: The main session covered Immersive technology in education (XR, 360 degree photo/videos, safety) with practical activities using MetaQuest3, along with a focus on Wellbeing in digital education.
- Conclusion: The course formally concluded with a Management board meeting to discuss the interim report.

COMPETENCES GAINED

Over the five days in Banja Luka, participants developed a wide range of competences that will strengthen their professional practice:

- Digital Competences: Integrating modern digital tools and multimedia into teaching, including skills in creating educational video tutorials , and understanding immersive technologies (XR, 360 photo/video).
- Pedagogical Innovation: Adoption of interdisciplinary approaches like STEAM and using chemistry for popularization through engaging, real-world examples (e.g., food authenticity, medicinal marijuana).
- Laboratory Competences: Improved knowledge of advanced analytical techniques (spectrophotometry, iodometric titration) and the ability to conduct low-budget, relevant experiments (food chemistry, dactyloscopy).
- Curriculum Alignment: Strengthening the connection between educational outcomes and labor market demands through the round table with stakeholders.
- Professional Networking: Sharing experiences with colleagues and project partners from STU, gaining new ideas for curriculum design and project involvement.

CONCLUSION

In conclusion, the five-day course in Banja Luka equipped teachers with a comprehensive set of modern pedagogical, digital, and laboratory competences, establishing it as an exceptionally successful event in the context of the ChemTeach project's goals.

Figure 1. Visit of professors from the Czech Republic and Slovakia to GIMNBL

Figure 2. Maillard´s reactions - preparing caramel lollipops

Figure 3. Educational lectures for the popularization of chemistry – Booze and hangover (Prof. Ing. Peter Szolcsanyi, PhD.)